

BULLETIN OF MISCELLANEOUS INFORMATION No. 3 1935 ROYAL BOTANIC GARDENS, KEW

IX.—OBSERVATIONS ON THE GENUS *COMMIPHORA* AND ITS DISTRIBUTION IN TANGANYIKA TERRITORY.

B. D. BURTT. (Survey Botanist, Department of Tsetse Research, Tanganyika Territory).

The genus *Commiphora* is still poorly represented in European herbaria, the material being often no more than featureless and leafless twigs. This is regrettable considering the importance of the genus in the African savannahs and the wide range of altitude and climate in which the many species are found. But their collection and preservation for herbarium purposes is usually a matter of some difficulty, because of their spiny nature, the irregular method of branching of many species, and the more or less resinous sap which causes the leaves to fall off during drying.

Owing to the lack of good material, therefore, our knowledge of *Commiphora* is quite inadequate for the preparation of a monograph or even a revision of the genus. Several species have never been re-collected since they were first described, whilst the status and distribution of many is a matter of conjecture. To this purpose much more material, with adequate descriptive and ecological notes, is needed.

For the past nine years the writer has lived in those savannah areas of Tanganyika Territory which lie to the north of the central railway where he has been acquiring information relating to the habitat and bionomics of the tsetse fly (*Glossina* spp.). During that time he has had much opportunity of collecting and studying *Commiphora* in the field, and it is hoped that the following brief account will stimulate others to do likewise and help to fill up the gaps in our knowledge of this important and interesting genus.

Several contributions have been made to our knowledge of *Commiphora* since Engler published his monograph and key to the species in 1912 (Engl. Bot. Jahrb. 48, 451), which dealt with 129 species and 10 varieties. Engler himself added 6 more species, 4 of them from Northern Nyasaland (Engl. Bot. Jahrb. 54, 292 : 1917). Sprague and Chiovenda have described 17 new species from British and Italian Somaliland, whilst other contributions include a new species from West Tropical Africa, and 2 from the Transvaal, bringing the total number of described species to 160, with 11 varieties.

Unfortunately some of the descriptions of *Commiphora* have been built up from single and inadequate collections, whilst in more

than one instance new species have been described from young and immature specimens (*C. ndemfi*, *C. pilosissima*, *C. subsessilifolia*, etc.). In addition, subsequent observation has shown that much diversity of leaf-form exists, even on the same tree, a point recognised by Engler, and forming the basis of one of the principle groups of the genus, namely, the *Heterophyllae*. Engler, however, owing to the lack of material at his disposal, described several which have proved to be leaf-forms of the same species, while in some cases he has unfortunately mistaken for *Commiphora* plants belonging to the *Anacardiaceae* and *Combretaceae*. These are enumerated at the end of this paper (see p. 116).

Variation in species of Commiphora.

Commiphora Stuhlmannii Engl. (*Pflanzenw. Ostafrikas* C, 230, (1895) is a widely distributed plant on "hard-pan" soils and termite-mounds in the Central Lake and Tabora Provinces. Considerable variation of leaf-form is revealed in this species, which, in the Shinyanga District specimens (Burtt 3999) matches the 4-jugate leaf-form collected by *Stuhlmann* 3450 from "Usindscha." The Shinyanga specimens show leaves with 2-6 pairs of pinnae, 4-5 pairs of leaflets predominating; moreover, leaves with elliptic-acute and ovate leaflets are found on the same tree. *Commiphora Krausei* Engl. (*Engl. Bot. Jahrb.* 44, 152 (1909), from Tabora, *Trotha jr. 8a*, also matches the Shinyanga plant and is undoubtedly *C. Stuhlmannii*.

In the Central Province *C. Stuhlmannii* usually has 2-3 pairs of leaflets and is matched by *C. Boehmii* Engler (*Engl. Bot. Jahrb.* 48, 472 (1912)). Engler describes his type of *C. Boehmii* from immature leaf material, and states that the young leaves are "dicht weisslich behaart," a characteristic of immature *C. Stuhlmannii*; moreover one specimen cited by Engler in the original description was collected from Saranda, in the Manyoni District, by *Fischer* no. 292.

The following recent collections of *C. Stuhlmannii* have been made:—Lake Province: Shinyanga, mature leaves, *Burtt* 3286, 3999; Mwanza, a large shrub, vernacular "Kungulu," *Swynnerton* 228. Central Province: Kondoa, Simbo Hills, flower and young leaves, 12.12.1927, *Burtt* 811; Kondoa, hills near aerodrome, leaves and fruits, 10.4.1928, *Burtt* 1629; Kondoa town, *Burtt* 1444; Kondoa, at Sambala, in leaf, 27.3.29, *Burtt* 2086; Sambala, leaf and fruits, 10.4.29, *Burtt* 1991; Bubu Valley, near Narai, flowers and twigs, 8.11.1927, *Burtt* 690; Singida District, near Wimban Steppe, flowers and twigs, 9.10.1927, *Burtt* 1626; Matelele, young leaf and flowers, 27.9.27, *Burtt* 726, 1631; Mwapwa District, Kikombo, leaves, 17.4.32, *Burtt* 3958; near Nzuhe Lake, flowering 26.11.33, *Burtt* 5046; Kazikazi, fruiting 28.7.32, *Burtt* 1923.

Several species of *Commiphora* occurring in Tanganyika Territory show much similarity to one another, and more material available

for comparison may prove the existence of further synonymy ; these are :—

<i>C. zanzibarica</i> (Baill.) Engl.	& <i>C. spondioides</i> Engl.
<i>C. Boiviniana</i> Engl.	& <i>C. morogorensis</i> Engl. & <i>C. pilosissima</i> Engl.
<i>C. Fischeri</i> Engl.	& <i>C. Stolzii</i> Engl.
<i>C. kyimbilensis</i> Engl.	& <i>C. puguensis</i> Engl.
<i>C. subsessilifolia</i> Engl.	& <i>C. salubris</i> Engl.
<i>C. pilosa</i> Engl.	& <i>C. rugosa</i> Engl. & <i>C. rubriflora</i> Engl.
<i>C. mollis</i> Engl.	& <i>C. ndemfi</i> Engl.

The following species from Tanganyika Territory have apparently never been re-collected since their description :—

- C. glabrata* Engl., Bagamoyo, *Holtz* 1193.
C. iringensis Engl., Uhehe, *Spiegel* 2507.
C. ndemfi Engl., Bulambya, *Stolz* 1678.
C. kyimbilensis Engl., Kyimbila, *Stolz* 1699, 1665.
C. pilosissima Engl., foot of Pare Mts., *Engler* 1563.
C. puguensis Engl., Pugu Hills, *Holtz* 1083.
C. rugosa Engl., foot of Pare Mts., *Engler* 1580.
C. salubris Engl., Kyimbila, *Stolz* 1683, 1769.
C. serrata Engl., Dar-es-salaam & Ruaha, *Hildebrandt* 1251.
C. Stolzii Engl., Kyimbila, *Stolz* 1725.
C. Trothai Engl., Usambara region, *Trotha* 233.
C. ulugurensis Engl., Ruaha, Rufiji, Ruvu area, *Stuhlmann* 8974.

Of the above *C. kyimbilensis*, *C. salubris*, *C. serrata*, and *C. Stolzii* are represented by well collected material ; on the other hand the type material of *C. pilosissima*, *C. rugosa* and *C. ulugurensis* is so poor and inadequate as to be almost useless for comparison.

Specimens collected from the Central Provinces of Tanganyika, *Burt* 844, 902, 1622, 1623, 1922, 1931, 3986, closely resemble *Stolz*'s specimens of *C. kyimbilensis*, but may prove to be new ; while bijugate forms of *C. Fischeri* Engl., *Burt* 2729, from Kondoa District, 3988, from Shinyanga, and *Lynes* 1 h. 48, from Iringa, closely resemble *C. Stolzii*.

Notes on the collection and preservation of Commiphora.

Specimens of twigs with leaves, sufficient for about six herbarium sheets, should be collected and pressed in two separate presses, which should then be laid out in the hot rays of the sun. The drying paper should be changed every morning without fail, for by this method the leaves do not fall off and break up, as they do when the specimens are dried slowly among a large collection of other plants.

In the case of very spiny species, crushing between cardboard has been found satisfactory, a method which obviates the use of drying paper (also a very satisfactory method with gall and other *Acacia*).

In addition to specimens of twigs, a number of leaves should be collected and dried separately to show their outline and to increase the available leaf-material which is often scanty on the twigs.

The minute flowers usually appear with the early rains, when the leaves are either absent, or in a very young and immature condition ; they should be collected separately, in as large a quantity as possible, and placed in a packet with adequate descriptive and ecological data.

Samples of bark should be sliced off and dried with notes stating whether the sap is pine-scented or scentless.

Fruits usually ripen long after leaf-fall has taken place ; they should be dried and stored in cardboard boxes with naphthaline to prevent insect ravage ; when possible a drawing of the fruiting axis should be made, together with the seed and aril, whilst notes on the colour of the latter would be useful.

Distribution of Commiphora.

The genus is very largely African, as only eleven species are recorded outside that continent ; of these, two occur in Arabia, two on the island of Socotra, six in India and one in Baluchistan.

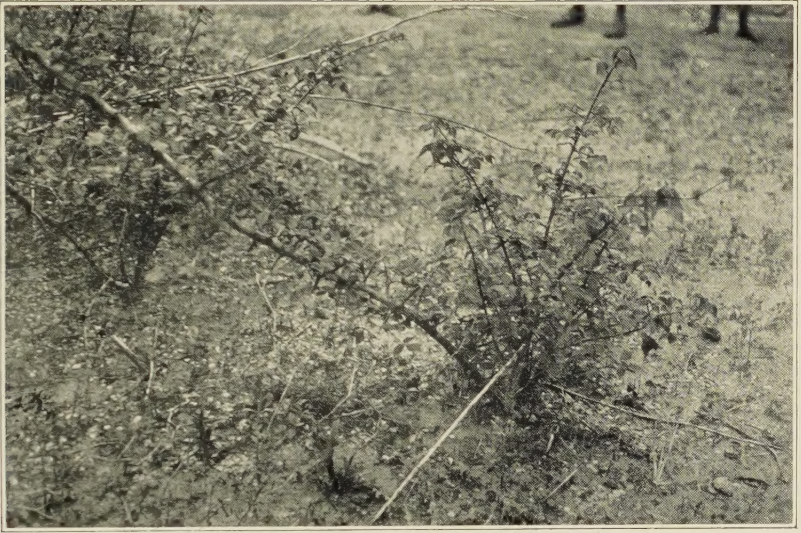
Commiphora is found throughout the continent of Africa. A summary of distribution which is open to revision as our knowledge increases has been compiled from records found in literature and recent material which has accumulated at Kew, the British Museum (Natural History) and the herbarium of the Imperial Institute of Forestry at Oxford ; this shows *Commiphora* to be distributed in Africa as follows :—

West Trop. Africa ...	...	7 species.
Cameroons and Congo ...	...	6 „
North East Trop. Africa ...	...	41 „
British East Africa ...	...	51 „
South Trop. Africa ...	...	28 „
Mascarenes ...	...	4 „
South Africa ...	...	27 „

Dispersal.

The fruit of *Commiphora* is a drupe with a single nut-like seed surrounded by an epicarp. When ripe this outer coat becomes red or pink and attractive to birds. To the seed is attached a fruity and bright coloured aril varying in size and form according to each species—the usual colour is crimson, but in *C. Merkeri* and *C. Swynnertonii* the aril is yellow, and in *C. laxiflora* pink. The ripe fruits are much sought after by various fruit-eating birds, especially the grey Turaku and various pigeons and doves. Seeds of *C. ugogensis* are stored by small rodents, and many kernels have been found with the marks of teeth of these animals on them. The seeds of *C. Stuhlmannii* have frequently been observed in the droppings of turtle doves, some distance from the parent plants.


PLATE I.



C. stolonifera B. D. Burtt
Showing vegetative reproduction by stolons. Manyoni.



C. stolonifera B. D. Burtt
Showing thicket produced by a single plant ; dry season. Mpwapwa.



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As birds are the principal agents of dispersal of *Commiphora*, one would expect the plants to be widely distributed in Tropical Africa ; however, it will be seen in the next paragraph how much *Commiphora* is limited by edaphic and climatic factors which greatly restrict the range of several species.

Distribution of Commiphora in Tanganyika Territory.

In Tanganyika Territory, the genus *Commiphora* ranges from the coastal belt, where *C. lindensis* Engl. is to be found along the borders of tidal mangrove swamps, throughout the vast areas of deciduous savannah woodland and desert thorn scrub of the central plateau to 6,500 ft. in the Mbulu District, where a species allied to *C. kymbelensis* Engl. marks the highest range of the genus in the Territory.

Commiphora is most conspicuous in the areas of 20–25 inches rainfall between 2,000 and 4,000 ft., and especially in the “insulation basins” (St. Clair Thompson), or “sunk-lands” of the Eyassi-Wembare Steppe, Lake Natron ; the Gulwe and Rukwa Valleys, the Kilimatindi, and parts of the Massai Steppe. In these regions the annual rainfall is only about 18 inches.

Commiphora Fischeri Engl. and *C. pilosa* Engl. have the widest distribution in the Territory, though the former is absent from the coastal regions ; they usually grow on alluvial slopes in the company of *Combretum Zeyheri*, *C. apiculatum*, *Terminalia sericea*, *Brachystegia edulis*, *B. itohensis*, *Isobertlinia globiflora* and *Ostioderris Stuhlmannii*. This plant community forms the deciduous woodland and is the principal habitat of the Tsetse Fly, (*Glossina morsitans*). *C. ugogensis* Engl. (Photo. 3 and 4), a fine tree, affects the same habitat as *C. Fischeri* and *C. pilosa*, but is limited to the Central, the Lake and Western Provinces.

The largest species in Tanganyika is *Commiphora Zimmermannii* Engl. which resembles an ash-tree in form and grows to 50 or 70 ft. in height. This plant is confined to rocky gorges in tropical rain forests and is recorded from the Wambara, Nguu, Kaguru and Uluguru Mts., while Haarer (No. 1759) has collected *C. Zimmermannii* from 4,500 ft. on Kilimanjaro.

Vast tracts of country such as the margin of the Wimbare Steppe, extending into the Districts of Nzega, Tabora, Shinyanga, Mwanza, Maswa, Musoma and much of the Massai Steppe are composed of a greyish alluvial sandy-clay, known locally as “hard-pan” or “semi-mbuga” (the “seepage-glades” of Jackson also belong here). The hard-pan country is clothed with “thorn-scrub” interspersed with open grassland, in which *Acacia* spp. and *Commiphora* spp. are co-dominant and form the potential habitat of the Tsetse fly (*Glossina swynnertonii*), and the home of many kinds of game including Rhinoceros, Elephant, Giraffe, Zebra, Eland and Impala.

Where “hard-pan” soils occur are found *Commiphora Schimperi* Engl. and *Lannea humilis* Oliv. in profusion, while everywhere are

small island-thickets varying from 2-30 yards in diameter, often centred round the nucleus of a termite mound. In these island-thickets are usually to be found *Commiphora subsessilifolia* Engl., and *C. Stuhlmannii* Engl. (*C. Boehmii* Engl.) growing out from the termite mound itself; *C. sarandensis* Burtt, with white straggling branches and foliaceous leaves growing in the centre of the thicket; *C. stolonifera* Burtt in the outer fringe of the thicket where the soft sappy branches of this species act to some extent as a protection from the seasonal grassfires. The remarkable blue-green-barked tree, *C. caerulea* Burtt, is often found in *Commiphora* thickets of the Central Province.

Where rocky hills or steep escarpments are found in the Central Plateau of Tanganyika we find another home of *Commiphora* usually of the *C. kymbilensis* group, with characteristic grey and fluted trunk. *C. laxiflora* Engl. (Photo 7), with yellowish-green bark, is seen less frequently, while *C. Eminii* Engl., with waxy pale-green foliage and deeply fluted trunk occurs along the fantastic outcrops of granite which form the coastline of the Speke Gulf of Lake Victoria, the Montini and Usanda Hills of Shinyanga District.

Several species of *Commiphora* are exceedingly local in their distribution and confined to areas of low rainfall; for example *C. Hornbyi* in the Kidete-Gulwe valley of Mpwapa District; *C. Merkeri* Engl., a species co-dominating with *C. Hornbyi*, has been recorded from Engaruka in the Natron region and south of Dodoma, and *C. Swynnertonii*, with remarkable shining yellow-green bark, from the Kilimatindi plains and South-east Massailand.

The Economic Value of Commiphora in Tanganyika.

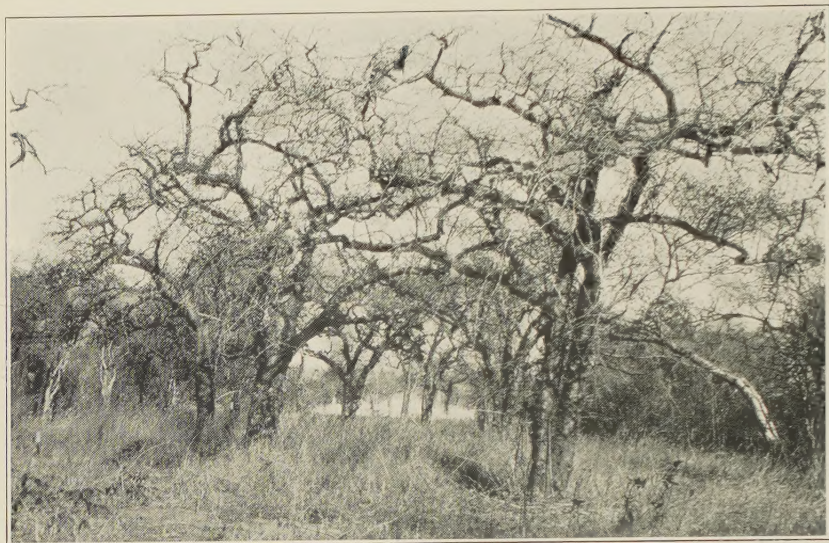
Commiphora Zimmermannii Engl., the "mbungwa" of the Usambara natives, yields a light straight-grained timber which takes a dark polish; it is however, not exploited.

C. Fischeri, *C. pilosa*, *C. Schimperi*, *C. subsessilifolia*, *C. Stuhlmannii* and *C. ugensis* Engl. are important constituents of the vast deciduous savannah woodlands which form the habitat of the two Tsetse flies *Glossina morsitans* and *G. Swynnertonii*—it has been shown by Mr. Napier Bax of the Tsetse Research Department that *C. Fischeri* and *C. pilosa* are completely killed by Termite-attack when the base of the tree is "filled" and earth piled round the injury. In this way valuable economic assistance is given to bush cleaning in anti-tsetse measures.

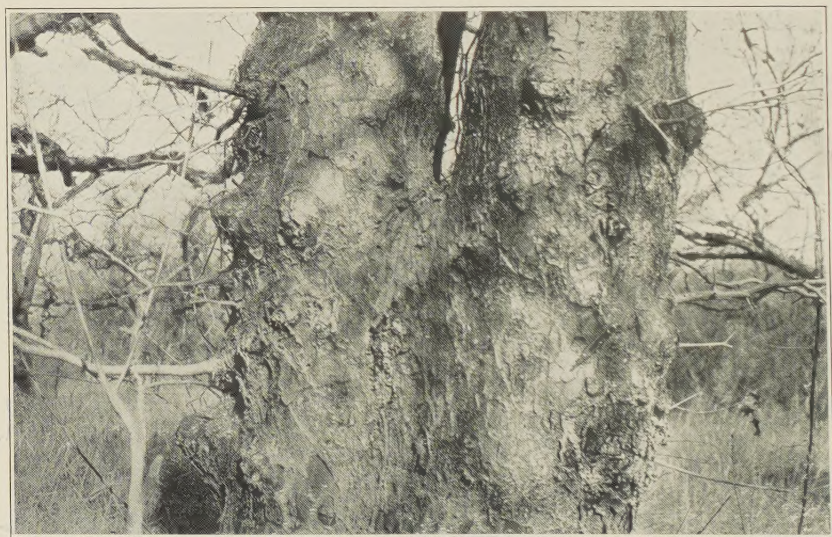
The soft sappy wood and clean straight stems of *C. pilosa*, *C. Schimperi* and *C. subsessilifolia* are much sought after by natives and game-scouts for the construction of gun-traps and drop-traps for the destruction of troublesome leopard and lion.

The remarkable manner in which all *Commiphora* poles take root when planted in the ground has made them invaluable to the native cattle owner for the construction of live-pole fences for the cattle-kraals. The Tsetse Research Department has been experimenting with live-pole fences for game control purposes.

PLATE II.



C. ugogensis Engl.
Mature trees at Manyoni ; dry season aspect.



C. ugogensis Engl.
Showing flaking bark.

Stools and spoons are carved from the wood of *C. ugogensis* by natives, while the Wagogo tribe carve useful milk-bowls from this wood.

A small and troublesome "mellipona bee," the "sweat bee," frequently nests in holes of *Commiphora*, the honey made by these bees being much sought after by natives.

The remarkable *C. stolonifera* Burt, with its spiny branches and stolon reproduction, suggests an admirable live-fence plant on hard-pan soils.

So far, there is no record of the gum which exudes from *C. Merkeri*, *C. Schimperi*, *C. Fischeri* and *C. kyimbilensis*, being used for any particular purpose.

New Species of Commiphora in Tanganyika Territory.

Five new species are now described for the first time; they are *C. caerulea*, Photos. 5 and 6, *C. Hornbyi*, *C. sarandensis*, *C. stolonifera*, Photos. 1 and 2, and *C. Swynnertonii*

There are a number of specimens of *Commiphora* still unidentified which may prove to be new when more material is available for comparison; these are—*Burt* 4964, 1926, from South East Massailand in the Handeni District, which resembles *C. Scheffleri* Engl. from Kibwesi, *Scheffler* 171. The leaves and flowers of the Tanganyika plant have not yet been collected, the fruit is sessile, while Scheffler's specimen has a well developed stalked inflorescence.

Another remarkable plant is allied to *C. Schimperi* Engl. but has a shrubby habit, only growing to 6 ft. high. This plant is extremely plentiful in S.W. Massailand, in the Kidete Valley of Mpwapa District (*Burt* 4962, 4960, 4963, 3994, and 4805).

A specimen collected by *Lynes* V8, from Njombe, has affinities with *C. kyimbilensis* Engl. but has only 2-3-jugate leaf. *Lynes* describes this plant as a tree 25 or more feet high occurring near a waterfall.

Alphabetical List of Species of Commiphora occurring in Tanganyika Territory.

Species	Observations
1. <i>C. baluensis</i> Engl.	W. Usambara, re-collected at Kibwesi (<i>Battiscombe</i> 906; <i>Rammell</i> 2738).
2. <i>C. Boiviniana</i> Engl.	Coastal. Inland plants are allied to this species.
3. <i>C. caerulea</i> Burt	Common in Central Province, hard-pan thickets.
4. <i>C. campestris</i> Engl.	Common at Wimbare and Shinyanga; in "salt-steppe."
5. <i>C. chlorocarpa</i> Engl.	Rufiji, a common Rhodesian plant.

Species	Observations
6. <i>C. edulis</i> Engl.	Kyimbila (<i>Stolz</i>) ; common southern plant.
7. <i>C. Eminii</i> Engl.	Common at Shinyanga and S. Coast Lake Victoria hills.
8. <i>C. Fischeri</i> Engl.	Very common.
9. <i>C. glabrata</i> Engl.	Bagamoyo ; not re-collected.
10. <i>C. Hornbyi</i> Burt	Locally common Kidete-Gombo valley near Mwapwa.
11. <i>C. iringensis</i> Engl.	Uhehe ; not re-collected.
12. <i>C. kyimbilensis</i> Engl.	Not re-collected ; specimens from Central Province allied to this species.
13. <i>C. laxiflora</i> Engl.	Central Province and Shinyanga.
14. <i>C. lindensis</i> Engl.	Common Coastal plant.
15. <i>C. Merkeri</i> Engl.	Locally common in the Gombo-Kidete Valley and foot of Oldeani and Engeruka.
16. <i>C. mollis</i> Engl.	Morogoro, common southern species.
17. <i>C. ndemfi</i> Engl.	Kyimbila ; not re-collected and probably young material of <i>C. mollis</i> Engl.
18. <i>C. pilosa</i> Engl.	Very common and widely distributed.
19. <i>C. pilosissima</i> Engl.	Foot of Pare Mts.; not re-collected, probably a form of <i>C. Boiviniana</i> .
20. <i>C. pteleifolia</i> Engl.	Common coastal species in thickets.
21. <i>C. puguensis</i> Engl.	Pugu Hills ; not re-collected ; allied to <i>C. kyimbilensis</i> Engl.
22. <i>C. rugosa</i> Engl.	Foot of Pare Mts.; not re-collected ; probably a form of <i>C. pilosa</i> Engl.
23. <i>C. salubris</i> Engl.	Kyimbila (<i>Stolz</i>) ; not re-collected, probably a form of <i>C. subsessilifolia</i> Engl.
24. <i>C. sarandensis</i> Burt	Common Central Province and Shinyanga, in hard-pan thickets.
25. <i>C. Scheffleri</i> Engl.	Kibwesi-Kenya ; plant from Handeni Massailand near this species.
26. <i>C. Schimperi</i> Engl.	Common Central Province, most likely widely distributed.
27. <i>C. serrata</i> Engl.	Dar-es-salaam and Ruaha, not re-collected since German times.
28. <i>C. stolonifera</i> Burt	Common Central Province and Wembare region.
29. <i>C. Stuhlmannii</i> Engl.	Very common in Central and Lake provinces.
30. <i>C. Stolzii</i> Engl.	Kyimbila (<i>Stolz</i>) not re-collected ; probably form of <i>C. Fischeri</i> .

Species	Observations
31. <i>C. subsessilifolia</i> Engl.	Common Central, Lake and Tabora Provinces.
Trifoliolate form	Local Central province ; where normal species is overshadowed.
32. <i>C. Swynnertonii</i> Burt	Locally common Kilimatindi ; Dodoma, Mpwapwa and S.W. Massailand.
33. <i>C. Trothai</i> Engl.	Pare and W. Usambara, not re-collected since German times.
34. <i>C. ugogensis</i> Engl.	Very common, Central, Tabora and Lake Provinces.
35. <i>C. ulugurensis</i> Engl.	Rufiji, Morogoro, a doubtful plant, not re-collected.
36. <i>C. zanzibarica</i> (Baill.) Engl.	Locally common coastal thickets.
37. <i>C. Zimmermannii</i> Engl.	Common in Rain Forest Rarineo ; Uluguru ; Nguu, Usambara, etc.

For citation of Engler's species see Engl. Bot. Jahrb. 48, 451 (1912) ; and 54, 292 (1917).

Field Key to the commoner species of Commiphora in Tanganyika Territory.

Commiphora species are readily distinguished from one another in the field by their characteristic appearance, such as spininess, colour of bark, scent of sap, whether tree or shrub, etc.—in many cases their appearance together with the habitat in which they occur, will give a fairly good indication of species.

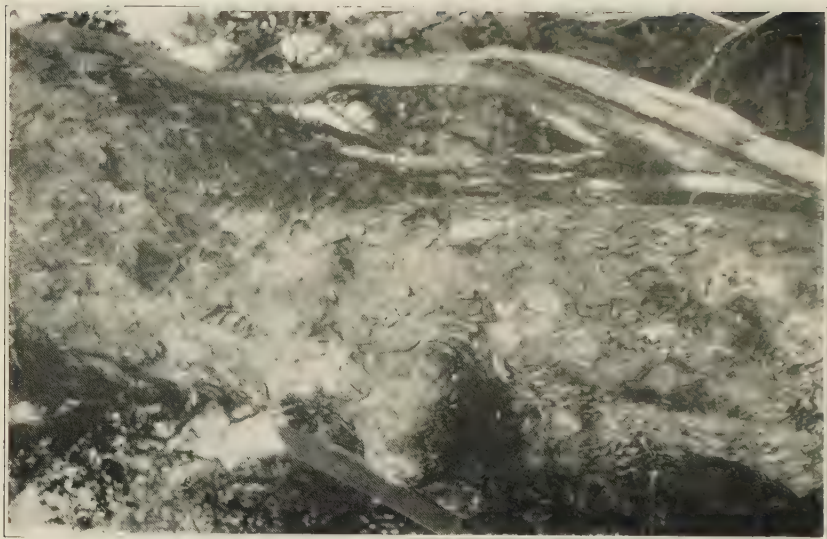
For the assistance of those in the field, a Field Key has been devised which readily distinguishes 24 of the best known species in the Territory, and it is hoped that by the use of this the less known species, which are not included in the Key, will be brought to light.

Species of *Lannea* may be mistaken for *Commiphora* ; in the field, however, the two are readily distinguished from one another, as all twigs of *Commiphora* are brittle and snap when bent, while *Lannea* twigs contain much fibre (" Kamba," vernacular for string), and may be bent in any direction without snapping.

1. (a) Shrubs 2.
- (b) Trees 7.
2. (a) Stolon reproduction ; sap strongly
resin-scented *C. stolonifera* Burt
- (b) Without stolon reproduction 3.

3. (a) Without spines ; bark silvery grey *C. sarandensis* Burt
 (b) With spines ; bark green with
 papery peeling 4.
4. (a) Bark bright yellow-green and shiny.
 leaves with brown tomentum....*C. Swynnertonii* Burt
 (b) Bark dull green ; leaves glabrous 5.
5. (a) Strongly resin-scented, leaf like
 C. Schimperi*C. Trothai* Engl. ?
 (b) Sap not resin-scented 6.
6. (a) Leaf fairly large, trifoliolate, on
 long stalk.....*C. pteleifolia* Engl.
 (b) Leaf small, simple or slightly tri-
 foliolate, on short stalk.....*C. lindensis* Engl.
7. (a) Bark bright blue-green, with white
 papery peel 8.
 (b) Bark green (often yellowish green)
 with straw coloured papery peel 9
 (c) Bark grey or brown, not as above 15.
8. (a) Sap strongly resin-scented, leaflets
 glabrous*C. Hornbyi* Burt
 (b) Sap unscented, leaflets with pube-
 scence of veins on under surface *C. caerulea* Burt
9. (a) Flat crowned tree (resembling
 Lannea humilis) ; sap vanilla
 scented.....*C. Scheffleri* Engl.
 (b) Not flat crowned trees, etc. 10.
10. (a) Sap pine-scented 11.
 (b) Sap not pine-scented 12.
11. (a) Trunk cylindrical ; leaf fresh green *C. Schimperi* Engl.
 (b) Trunk gnarled and fluted ; leaf
 grey-green with waxy bloom.....*C. campestris* Engl.
12. (a) Non-spiny ; leaf pinnate.....*C. laxiflora* Engl.
 (b) Spines on branches 13.
13. (a) Leaves pinnate, trunk with bark
 flaking off as well as peeling ;
 knobbly, medium-sized tree ;
 large fruits.....*C. ugogensis* Engl.
 (b) Leaves not pinnate ; small trees 14.
14. (a) Leaves pubescent, especially below,
 trifoliolate*C. pilosa* Engl.
 (b) Leaves glabrous, simple (or rarely
 trifoliolate)*C. subsessilifolia* Engl.
15. (a) Bark with conspicuous untidy
 papery peel 16.
 (b) Bark smooth, or, with only fine
 powdery peel 18.
16. (a) Bark with large untidy transverse
 lenticels*C. Merkeri* Engl.
 (b) Bark without conspicuous lenticels 17.

PLATE III.



C. caerulea B. D. Burt
Note peeling of bark on old trunk.
Near Mpwapwa.



C. caerulea B. D. Burt
Shewing smooth, whitish branches.
Kilimatinindi.

17. (a) Bark grey with straw-coloured peel
leaves large, pinnate.....*C. zanzibarica* (Baill.)
Engl.
- (b) Bark with reddish-copper coloura-
tion ; leaves large, trifoliate...*C. Fischeri* Engl.
18. (a) Trunk cylindrical*C. Boiviniana* Engl.
- (b) Trunk with conspicuous longitudinal
fluting 19.
19. (a) Small tree, branching near ground ;
branches spreading.....*C. Stuhlmannii* Engl.
- (b) Tall trees, usually with clean bole
to 10 ft. 20.
20. (a) Leaflets glabrous, with waxy bloom 21.
- (b) Leaflets with slight or pronounced
pubescence 22.
21. (a) Leaflets 5 pairs, on pronounced
stalks*C. Eminii* Engl.
- (b) Leaflets 3-4 pairs, on only slight
stalks*C. sp. nr. kyimbilensis*
Engl.
22. (a) Large rain-forest tree with large
serrate leaflets.....*C. Zimmermannii* Engl.
- (b) Small savannah tree ; small entire
leaflets*C. mollis* Engl.

Commiphora caerulea B. D. Burtt, sp.nov. ; affinis *C. rosifoliae* Engl. sed nervis lateralibus paucioribus, reticulatione infra minus conspicuo differt.

Tree 3-15 m. high, with a regular spreading crown ; trunk up to 0.8 m. in diam. at 1.7 high, and often unbranched for 3.10 m. ; bark of trunk of older branches peeling off entirely every year about July, peel cream-coloured and papery ; before peeling, the trees have a distinctive pale milky-blue appearance at length changing to a rich blue-green colour ; sap of old wood watery and scentless. *Twigs* silvery-grey and spineless, clothed with greyish tomentum when young but this wearing off with age. *Leaves* and inflorescence borne at the ends of small stumpy lateral twigs which vary from 6 mm. to 5 cm. in length ; leaves 3-foliate or pinnately 5-foliate, both forms on the same tree ; leaflets elliptic and acute, with prominently serrate margin, clothed with grey indumentum on the lower surface and the rachis, with only a few scattered hairs on the upper surface ; indumentum becoming greatly reduced with age especially on the upper surface which becomes shiny. *Inflorescence* appearing when the leaves are very young and either single and borne on a short peduncle or branched on a stalk about 2.5 cm. long clothed with a fine grey indumentum ; calyx densely pubescent ; petals pale yellowish-green and clothed with silvery indumentum outside. Fruit ripening in late July ; aril scarlet.

TANGANYIKA TERRITORY : between Mpwapwa and Tabugwe, in thicketed ravines in *Brachystegia microphylla*—*Isoberlinia globiflora* woodland, *B. D. Burtt* 3992 (type ; leaf specimen). Gulwe, near Mpwapwa, 2.1934, *H. E. Hornby* (flowers and young leaf). Kondoa-Irangi Distr., at Thlawa in the Simbo Hills, 15.12.1927, *B. D. Burtt* 833 (flowers and young leaf). Hills above Kondoa-Irangi aerodrome, *B. D. Burtt* 1621. Near Kazikazi in Manyoni Distr., in *Acacia pallens*—*Commiphora* spp. thickets, *B. D. Burtt* 3997 (specimen of bark) ; Manyoni Distr., at Kilimatindi on the Rift Escarpment, *B. D. Burtt* 3342. Singida Distr., along the edge of the Wembare Steppe at Matelele, *B. D. Burtt* 1411. Shinyanga Distr., Shinyanga Kopje, tree to 10 m., 3.8.1931, *B. D. Burtt* 2915 (young leaves and flowers).

Trees of this species are usually conspicuous owing to the bright coloured bark ; they occur gregariously in thickets on hard pan soils ; specimens were seen by me but not collected on the Rift wall between Lake Manyara and Engaruka, in the Massai Steppe near Old Lolderobo and Makami.

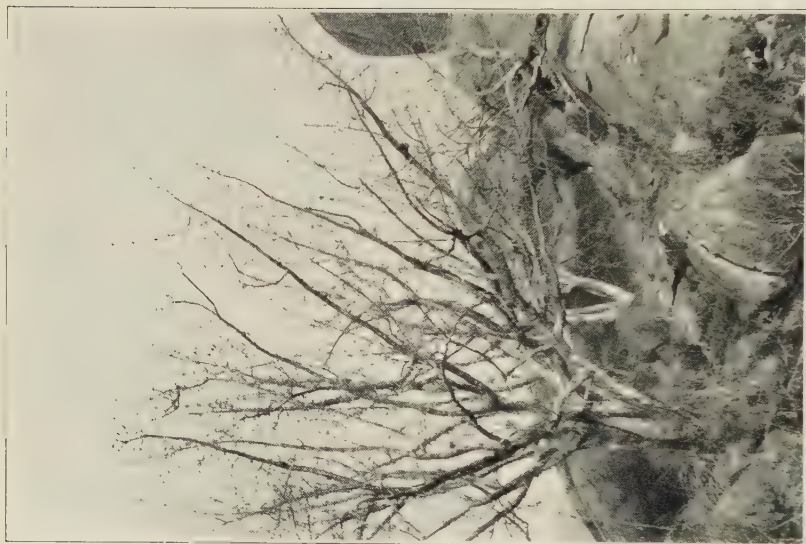
The fruits ripen in late July, when the trees are leafless ; they take about 6 months to mature.

Commiphora Hornbyi *B. D. Burtt*, sp.nov. ; affinis *C. caeruleae* Burtt, sed ramis pendulis, cortice diu pallide flavo-viridi, succo resinoso differt.

Tree 3.3–11.6 m. high, with regular spreading crown ; trunk about 0.6 m. in diam. at 1.6 high ; bark of trunk and older branches peeling off annually about July, in large papery cream coloured pieces ; before peeling trees pale yellowish-green, afterwards changing to light blue-green ; sap of old wood, leaves and young fruit strongly pine-scented and of a resinous consistency ; twigs glabrous, silvery-grey, spineless. *Leaves* pinnately 5–7-foliolate, rarely trifoliolate ; leaflets elliptic, glabrous, with a slight waxy bloom when young, margin slightly serrate, lateral nerves inconspicuous ; petiolules 1–3 mm. long. *Inflorescence* glabrous, usually appearing in profusion before the leaves or when they are very young, borne on a peduncle 2.5–5 cm. long ; flowers appearing in early December with the first rains, 3–10 in number, borne on pedicels 5–7 mm. long, which arise from the same point as a number of filamentous bracts 3–5 mm. long ; petals honey-coloured, short, giving the flower a cup-shaped appearance. *Fruits* 1.5 cm. long and 1 cm. broad, oval, usually borne in pairs, ripening in April, the epicarp becoming damson-coloured.

TANGANYIKA TERRITORY : Mpwapwa Distr., at Gulwe, very common on red alluvial soil clothed with *Commiphora* spp. and *Cordyla africana*, 3.12.1933, *B. D. Burtt* 5008 (flowers) ; near Gulwe, 26.4.1932, *B. D. Burtt* 3965 (type). Mpwapwa—Gulwe thickets 24.4.1932, *B. D. Burtt* 3960 ; 3.12.1933, *B. D. Burtt* 5007 (flowers) ; 31.3.1932 (coll. by Mr. H. E. Hornby), *B. D. Burtt* 1934 (fruit).

PLATE IV.



C. latiflora Engl.
Showing habitat among granite rocks;
flowering. Manyoni.



C. campestris Engl.
Sakanalewa, W. Wembare.

This closely resembles *Commiphora caerulea* Burt in the field but is distinguished by the young branches being more pendulous, the bark retaining its pale yellow-green appearance for a longer time, and the resinous consistency of the sap. It occurs commonly in the dry valley of the Gulwe-Gombo River as far as Kidete in the Kilosa District. It is associated with *Commiphora Merkeri*, *Commiphora caerulea*, *Commiphora Stuhlmannii*, *Cordyla africana*, *Delonix elata* and *Lannea Kirkii*, when the above species form extensive thickets on either side of the valley between 2,900 and 3,500 ft. The thicket near Kidete has been known to harbour the Tsetse flies *Glossina palidipes* and *Glossina austeni* in the leafy season.

Commiphora sarandensis B. D. Burt, sp. nov. ; affinis *C. Holtzianae* Engl. sed foliolis apice acutis nec cuneatis majoribus demum glabrescentibus differt.

A loosely-branched, straggling shrub rising to about 3 m. from a single, or several axes ; stem 7–13 cm. in diam. at the base and usually forking near the ground ; main branches few, straggling and supported by other elements of the thickets ; bark of stem and main branches finely scaled and silvery-grey coloured, giving the plant a characteristic white appearance ; where the lateral branches join the main axis they are usually supported by a slight buttress or elbow ; twigs long and spineless, slightly pubescent when young and often pale brownish in colour, longitudinally ribbed. *Leaves* herbaceous, always trifoliate ; leaflets broadly obovate and acute at the apex, crenate-serrate, sparsely clothed above and below with greyish hairs, especially when young, but these mostly falling off with age except along the peduncle and main nerves on the lower side of the leaflets ; petiole often tinged with reddish-brown ; middle leaflet of mature leaves often 6 cm. long and 4 cm. broad. *Flowers* appearing in December and January with the immature leaves, capitate ; calyx and bracts clothed with buff indumentum ; petals pale greenish-yellow when fresh and about as long as the calyx, clothed with fine silvery-buff hairs on the outer surface. *Fruits* ripening in July, sessile, pointed, about 1.3 cm. long, somewhat flattened, covered with a waxy bloom when fresh, becoming pink when ripe ; seed with a small 4-lobed aril.

TANGANYIKA TERRITORY : Manyoni Distr. ; Kisigo River, 1300 m., fls. 14.12.1932, B. D. Burt 3974 (type). Saranda, below the top escarpment of the Rift Valley, very common in *Acacia*—*Commiphora* thicket on "hard-pan" soils, 12.12.1932, B. D. Burt 3981, 3982, 3983 (fls. and young leaves) ; Kazikazi, in *Acacia pallens*—*Commiphora caerulea* thicket, fr. 26.7.32, B. D. Burt 1932, 1933. Kondoa Distr. ; Sambala in *Commiphora*—*Acacia mellifera* thicket, rare, B. D. Burt 2090. Mpwapwa Distr. ; between Nzuhe and Tubugwe, 24.4.1932, B. D. Burt 3964. Shinyanga Distr. ; on Seke Road, fl. 4.1.1933, B. D. Burt 3978 ; Ngonko River, near Old Shinyanga, 3.4.1932, B. D. Burt 3989.

Commiphora sarandensis B. D. Burt is closely allied to *Commiphora Holtziana* Engl. (Engl. Bot. Jahrb. **34**, 310); but differs from this species in having acutely pointed instead of cuneate leaflets; moreover, the leaf of *C. Holtziana* is densely cinereopilose on both sides, and very much smaller than those of *C. sarandensis* (although the leaves of Engler's specimen are obviously immature). Engler describes his specimen as an "irregularly branched tree 4-5 m. high" while *C. sarandensis* is always of straggling habit.

C. sarandensis occurs usually inside "island-thickets." on "hard-pan" soils, composed of *Lannea humilis*, *Acacia mellifera*, *Commiphora Stuhlmannii*, *C. Schimperi*, *Combretum parvifolium*, and *Terminalia Stuhlmannii*. The plant is quite common where it occurs, but is not readily seen as it is masked by the other components of the thickets.

The sap of the branches and leaves of *C. sarandensis* is watery and scentless, but that of the young fruit is resinous and strongly apple-scented.

***Commiphora stolonifera* B. D. Burt**, sp. nov. affinis *C. samhavensi* Schweinf. sed foliis majoribus differt.

Shrub 2-3.3 m. high, 7.5-12 cm. diameter at the base, much branched, soft-wooded and very spiny, with a rambling habit; branches bending over and rooting at the tips in the form of a stolon, from which vigorous young plants are produced and repeat the process; bark silvery-grey, peeling off annually; peel yellowish-brown, papery, semi-transparent, exposing dark-green, shiny young bark (sometimes brown-tinged); older branches silvery-grey, borne at right angles to the main axis arising from "buttressed elbows," young branches dark greenish-brown, glossy; lenticels few, small and corky; sap resinous, strongly pine-scented, comparable to Douglas-fir (*Pseudotsuga Douglasii*). Twigs sienna-red, 5-15 cm. long, spine-tipped, lateral spines occurring on main axis of twig; spineless twigs 0.6-1.2 cm. long bearing the leaves and inflorescence. Leaves always trifoliate, petiole \pm 3.7 cm. long (specimens from Manyoni Distr. shortly and silvery tomentose, from Mpwapwa quite glabrous); leaflets obovate, acute, margin serrate or slightly crenate, central leaflet \pm 3.7 cm. long \pm 2.5 cm. broad. Inflorescence appearing in September before the leaves, consisting of a loose 3-branched cyme \pm 3.7 cm. long; this and the calyx dark crimson, covered with viscid glandular hairs. Petals crimson, twice as long as calyx. Fruit ripening in February and March, epicarp turning pink when ripe, slipping off and exposing the seed, which is covered with a thin scarlet fleshy layer.

TANGANYIKA TERRITORY: Manyoni Distr.; near Ikonzi Stream on hard-pan soil 4,200 ft., 28.12.1931, B. D. Burt 3460 (type; leaf specimen). Kisigo River, common on hard-pan soils among *Acacia mellifera* and *Commiphora subsessilifolia*, 14.12.1932, B. D.

Burt 3973 (young fruits). Singida Distr. ; East margin of Wembare Snppe at Matelele, common on hard-pan soils, flowering 27.9.27, *B. D. Burt* 729 (flowers). Mpwapwa Distr. ; Gombo Valley between Gulwe, Nzuhe Lake and Kidite, 2,900 ft., common in *Commiphora Merkeri*, *Commiphora Hornbyi*, and *Cordyla africana* thicket, 17.4.1932, *B. D. Burt* 3966. Near Matamondo 7.2.1933, *B. D. Burt* 1936 (fruits).

Commiphora stolonifera *B. D. Burt* resembles *C. samhaventis* Schweinf. from Eritrea (Engl. and Prantl., Pflanzenfam. 3, 4, 253 (1896) (nomen)), in the texture of the bark and shape of the leaf and fruit ; the leaf, however, is very much smaller in *C. samhaventis*.

C. stolonifera is found chiefly in the Central Province of Tanganyika and along both sides of the Wembare Steppe. Plants have been seen between the Wembare and Nzega.

The plant is peculiar for its vegetative reproduction by stolons and should be useful in producing live fences for smaller game or cattle on "hard pan" soils, as it forms an intensely spiny and impenetrable thicket impervious to all larger game with the exception of elephant and rhinoceros.

***Commiphora Swynnertonii* *B. D. Burt*, sp. nov. foliis unifoliolatis sessilibus dense rufo-tomentosis distincta.**

A very spiny, much-branched shrub, branching near the ground from a short stem 8-15 cm. in diam. and growing up to nearly 3 m. high ; sap watery and slightly pear-scented ; branches trailing, their tips reaching to the ground, but no stolons observed ; spiny twigs arising radially from swollen "elbows" along the branches at about every 2.5-5 cm., giving a very spiny appearance ; branchlets steel-grey and glossy, ending in a terminal spine, short subsidiary branchlets, which are spineless, bearing the leaves and flowers. *Leaves* sessile, unifoliolate, and shaped like those of *C. subsessilifolia* Engl., 1.3-4.5 cm. long when fresh, the margins finely serrate, the serration commencing about one-third of the way up the margin ; surface clothed with dense rufous indumentum and felty on the midrib when young ; the leaves borne in terminal rosettes or alternately along the very young shoots, these also clothed with rufous indumentum. *Inflorescence* sessile, but flowers not collected. *Fruits* sessile and pointed, ripening in April after leaf-fall, the epicarp becoming pink and falling off exposing the seeds which are covered with a thin yellow apricot-flavoured layer ; aril almost absent and represented by a slightly thicker "fruity" coat along the keel and margins.

TANGANYIKA TERRITORY.—Manyari District at Mtewe on the Kilimatinzi Plains, growing locally in profusion among exposed duricrust rocks of a small escarpment, 16.12.1932, *B. D. Burt* 3827 (type) ; same locality, seeds, 7.4.1933, *B. D. Burt* 1935 ; leafless specimens were also seen gregariously in the Dodoma District, between Bahi and Dodoma in thickets near outcrops of granite in

Isoberlinia-Brachystegia wooding. Between Dodoma and Mpwapwa, and in South Massai Steppe between Handeni and Kibaya near Kisimacha Muungu, *B. D. Burt.*

Commiphora Swynnertonii B. D. Burt grows gregariously in desert conditions in thickets containing *Justicia salviflora*, *Dalbergia* sp., *Ochna Stuhlmannii*, *Salvadora persica*, *Commiphora stolonifera*, *Grewia villosa*, *Gardenia resiniflua* and *Euphorbia bilocularis*.

Note on *Commiphora subsessilifolia* Engl.

A remarkable trifoliolate form of *C. subsessilifolia* Engl. is commonly met with in shaded ravines or where this plant is over-shaded by some large tree. The trifoliolate form has been noticed in young and vigorous shoots appearing in the early rains, in the normal habitat. *Burt* 2088 from Sambala in the Kondo District shows the normal unifoliolate leaf of *C. subsessilifolia* and the trifoliolate leaf on the same twig.

Burt 3959 and 3993 show extreme forms collected at Kikombo in the Mpwapwa District.

In the former specimen the leaf reaches the unusual dimensions of 10 cm. long, while a petiole 1.3 cm. long is seen. The lateral leaflets are 2.5–4 cm. long. In no. 3993 the lateral leaflets are vestigial and only 0.3–1.3 cm. long.

Another remarkable feature of the trifoliolate form of *C. subsessilifolia* is the extremely acute apex of the leaflets. *C. salubris* Engl. from Kyimbila, *Stolz* 1683, 1769, of which only young leaf material is available, may prove to be the trifoliolate form.

The trifoliolate leaf of *C. subsessilifolia* Engl. resembles closely large leaves of *C. Schimperi* Engl.; however, the two species are readily distinguished in the field, as leaves of *C. subsessilifolia* are not resin-scented, while those of *C. Schimperi* are strongly resin-scented.

Excluded species.

*C. subglauc*a Engl. Bot Jahrb. 48, 469 (1912), *Holtz* 1064, type from Zanzibar, 1903, is *Slerocarya caffra* Sond. The attenuated apex of the leaf of *Holtz*'s specimen together with the venation and leaf-margin agree exactly with that species, while the fruit is too immature to be of descriptive value.

C. taborensis Engl. Bot Jahrb. 44, 153 (1909), is obviously *Lannea humilis* Oliv. Engler's description is based on leaf-material collected by *Trotha jun.* 78 from Tabora, and he quotes the native name "mtinje" which is the well-known Kinyamwezi and Kisukuma vernacular of *L. humilis*. Moreover, Engler has overlooked the stellate hairs which densely clothe the leaves of *Trotha*'s specimen and are characteristic of *L. humilis*, but are not to be found in any known *Commiphora*.

C. tomentosa Engl. Bot. Jahrb. 34, 308 (1904), collected by *Uhlig* (no. 39 type) from the Buraberge in the neighbourhood of



C. Boiviniana Engl.
Typical tree in leaf season. Mpwapwa.



C. Boiviniana Engl.
Leaf and young fruit. Mpwapwa.



C. Boiviniana Engl.
Ripe fruit when leafless. Kikombo - Mpwapwa.

Mt. Kilimanjaro is also a *Lannea*, as the type specimen has the characteristic stellate hairs of *Lanneas* of the *L. humilis* group. Uhlig's specimen is trifoliolate and may be merely an unusual form of *L. humilis* Oliv.

C. Holstii Engl. Pflanzenw. Ostafrikas, 229 (1895) is a species of *Combretum* (*C. aculeatum* Vent.). The type specimen was collected by Holst 2408 at Kitivo in Massailand.

Acknowledgments are due to the Director of the Botanical Museum, Dahlem, Berlin, for permission to consult type specimens in 1928, to Dr. J. Hutchinson for much valuable help and criticism, and to Mr. A. W. Exell, of the Natural History Museum, who has made valuable outline drawings of Engler's type specimens. The photographs reproduced were all taken by the author.

X.—CONTRIBUTIONS TO THE FLORA OF TROPICAL AMERICA : XXIII.* N. Y. SANDWITH.

NOTABLE ADDITIONS TO THE FLORA OF BRITISH GUIANA.

The records and descriptions of new species in the present paper are compiled from the results of several recent collections in this Colony. The work of identifying the valuable material of Mr. T. A. W. Davis' expedition into the Rupununi district in 1931 has been continued. Prof. R. E. Fries has named all Mr. Davis' *Annonaceae*, with the exception of the Guatterias, and has described no less than seven new species (*Malmea discolor*, *Crematosperma guianense*, *Duguetia cauliflora*, *D. cuspidata*, *D. elegans*, *D. Sandwithii* and *D. macrocalyx*) in Acta Horti Bergiani, Band 12, no. 1 (1934). Besides these, *Anaxagorea multiflora* R. E. Fr., *Duguetia lucida* Urb. and *Fusaea longifolia* (Aubl.) Safford were collected for the first time in the Colony. Since then Mr. Davis has been collecting for the Forest Department in the neighbourhood of the Mazaruni Station and on the Lower Cuyuni River, and shows that it is still possible to discover new trees in the coastal rain forests. The flora of the Cuyuni River is, indeed, of extraordinary interest. Another trip to the Mahaicony River (near the coast, in Demerara County) was organized by the Forest Department in March 1934 and produced an interesting collection of savannah species.

Two large consignments of undetermined sheets from the Jenman Herbarium, Georgetown, have been dealt with during the last two years, and several first records were found amongst them. Assistance has also been given to Mr. T. G. Tutin in the identification of the very interesting collection of the Cambridge University Expedition to British Guiana in 1933, but the botanical results of this expedition are being published for the most part in "The Journal of Botany, British and Foreign." Finally, a small collection from the neighbourhood of Roraima, collected in November and December of 1931 by Mr. N. J. Abbenetsets, was received through

* Continued from K.B. 1934, 368.

the Forest Department. This included many of the strange endemics of this region which are collected by all botanists who reach the summit of the mountain, but a few, notably *Hypericum roraimense* Gleason, *Palicourea obtusata* Krause and *Psychotria spicata* Benth. (non Müll. Arg.), are at present very rare in herbaria.

ANNONACEAE.

Xylopia frutescens Aubl.

Mazaruni Station, Sept., 1932, *Davis* in *Forest Dept.* no. 2322 : second-growth tree about 40 ft. high, on sandy hill slope in secondary forest about 14 years old ; flowers milk-white, scented.

Distr. Widely distributed in Continental Tropical America from British Honduras to Minas Geraes, Brazil.

POLYGALACEAE.

Securidaca orinocensis Rusby.

Devil's Hole Rapids, Cuyuni River, *Bartlett* in *Bot. Gard. Herb.* 8283 : climbing shrub with pink flowers.

Distr. Eastern Venezuela.

This species is characterised among its allies by the cordate base of the leaves, the simple racemes, and the unusually large flowers with sericeous-pubescent alae (compare *S. pubiflora* Benth.)

GUTTIFERAE.

Chrysochlamys Weberbaueri Engl.

Right bank of Rupununi River, a few miles above the mouth of the Maparri Creek, Sept., 1931, *Davis* in *Forest Dept.* no. 2162 : tree about 30 ft. high and 6 in. diam., with stilt roots, growing beside a small mountain stream on reddish sandy soil ; flowers cream ; fruit very pale green, marked with red like an apple.

Vernacular name, ? *Tapirero* (Wapisiana).

Distr. Amazonian Peru.

THEACEAE

Ternstroemia dentata (Aubl.) Sw.

Southern side of Kanaku Mountains, right bank of Rupununi River near Sand Creek, Oct., 1931, *Davis* in *Forest Dept.* no. 2245 : tree about 50-60 ft. high and 12 in. diam., on top of a hill in dry miscellaneous forest near savannah ; sepals creamy pink ; corolla white tipped with yellow.

Vernacular name, ? *Omirir* (Wapisiana).

Distr. French Guiana, Amazonian Brazil.

RUTACEAE.

Galipea Davisii *Sandwith*, sp. nov.; juxta *G. trifoliatam* Aubl. atque *G. ciliatam* Taubert ponenda, ab ambabus calyce truncato brevissime denticulato extra dense vestito differt, praeterea a *G. trifoliata* indumento foliorum petiolorum inflorescentiaeque, a

G. ciliata inflorescentia rigida calyce multo majore corolla multo crassiore statim distinguitur.

Arbor mediocris, ramulis summis tenuiter sed conspicue striato-costatis satis dense furfuraceo-pubescentibus. *Folia* trifoliolata; petiolus 1.7–5.5 cm. longus, inferne adpresse pubescens, superne dense patenter villosulus; petioluli brevissimi, dense villosuli; foliola elliptica, elliptico-ovata, vel oblanceolata, apice satis abrupte in acumen emarginatum 5–10 mm. longum attenuata, basi acute cuneata, 3.5–18.5 cm. longa, 1.4–7.5 cm. lata, terminale lateralibus longius, chartacea, marginibus regulariter ciliato-pilosis, praeterea supra costa dense (saltem inferne) nervis primariis sparse pilosis, subtus costa basin versus pilosa necnon axillis nervorum nonnunquam barbatis, ceterum glabra, utrinque intricate aequaliter reticulata et crebre punctata, nervis primariis lateralibus utrinsecus circiter 10 ascendentibus ac arcuato-anastomosantibus. *Inflorescentiae* axillares, foliis breviores, ubique pilosulo- vel furfuraceo-pubescentes, breviter corymboso-thyrsoideae ac ad 3.5 cm. latae, pedunculo nudo rigido 4–6 cm. longo, apice ramis paucis cymas trifloras gerentibus rigidis ascendentibus rectis dense pubescentibus inferioribus ad 1.3 cm. longis terminato. *Bractaeae* lineari-subulatae, vix 2 mm. longae. *Flores* albi; pedicelli brevissimi, crassi, sulcati, 1–2 mm. longi, indumento calycis vestiti. *Calyx* campanulatus, costatus, truncatus, minute denticulatus denticulis vix 0.2 mm. longis, circiter 4 mm. longus, vix 3.75 mm. latus, extra indumento duplici (et furfuraceo et pilosulo) dense griseo-tomentosus. *Corolla* ante expansionem subclavato-cylindrica, costata, extra siccitate arcte argenteo-sericea, circiter ad 2 cm. longa, sed alabastris junioribus saepius multo brevioribus, 2.5–3.2 mm. lata; tubus 8–12 mm. longus, intus basi ipsa glabra excepta dense adpresse albo-villosulus; lobi more generis imbricati, lineari-lanceolati, 7–9 mm. longi, 1.5 mm. lati (expansi haud visi, forsitan longiores latioresque). *Stamina* 2 fertilia antheris crassis linearibus 3–3.5 mm. longis, 0.8–1.1 mm. latis, appendice connectivi glabra 1–1.2 mm. longa atque 1 mm. lata, filamentis liberis haud visis. *Staminodia* 5, siccitate nigra, lineari-lanceolata, 1.75–2 mm. longa, apice glandula parva flavido-brunnea terminata. *Discus* basin ovarii cingens, cupularis, margine irregulariter sinuato atque denticulato, brunneus, glaber, 0.5–0.8 mm. altus. *Ovarium* 5-loculare, loculis 2-ovulatis, subglobosum, circiter 1.2 mm. longum et 1.3 mm. diametro, dense albo-villosum. *Stylus* 8–12 mm. longus, glaber sed glandulis parvis adpersus, apice subintegr. *Fructus* non visus.

BRITISH GUIANA. Essequibo River, left bank about 50 miles S.S.E. of confluence with Rupununi River, June, 1931, *Davis* in *Forest Dept.* no. 2056 (typus): tree about 60 ft. high and 8 in. diam., in miscellaneous forest in which a thorny palm forms an understory, on brown sand on low-lying but not swampy land; flowers white.

A very distinct species, not closely resembling either *G. ciliata* or *G. trifoliata*, yet clearly related to them, and especially to the latter.

The indumentum of the leaves is strikingly similar to that of *G. ciliata*. The floral measurements are taken from mature buds, since no fully expanded corolla was present on the material.

Fagara apiculata *Sandwith* sp. nov.; floribus subsessilibus, foliolis oblongis usque obovatis apice obtusis rotundatis vel truncatis brevissime apiculatis vel cuspidatulis insignis; ex affinitate **F. Krukovii** (*A. C. Smith*) *Sandwith* comb. nov.*, forma magnitudine foliorum statim distinguenda; *F. acreana* Krause atque *F. juniperina* (Poepp.) Engl. floribus conspicue pedicellatis, *F. Weberbaueri* Krause acumine folioli longo optime differunt.

Arbor excelsa, ramulis spinis armatis etiam prope apicem crassis rugosis saltem 1 cm. diametro pubescentibus. *Folia* 25–40 cm. longa, petiolo 3·5–5·5 cm. longo atque rhachi teretibus tenuissime striatis satis dense minute pubescentibus; internodia rhacheos 3·7–7·5 cm. longa (summo nonnunquam breviora), nuda vel spinis paucis parvis vix ad 2 mm. longis armata; petioluli pubescentes, 2–8 mm. longi (ut videtur nonnunquam longiores); foliola 4–6-juga, opposita vel fere opposita, oblonga, obovato-oblonga, vel obovata, apice obtusa rotundata vel truncata et brevissime (vulgo 1–2 mm., raro ad 3·5 mm.) satis late cuspidatula vel apiculata, basi plus minusve (nonnunquam valde) inaequilateraliter cuneata, ima saepe tantum 3·5–5 cm. longa, 2–3 cm. lata, superiora 6·5–12 cm. longa, 3·7–5·8 cm. lata, coriacea, siccitate vulgo purpurascentia, costa nervisque primariis utrinque minute puberulis ceterum glabrata, margine fere plano vel revoluta obscure vel satis conspicue praesertim dimidio superiore crenulato, subtus sub lente crebre punctulata, nervis primariis utrinsecus circiter 8–10 ascendentibus ac intricate anastomosantibus, rete venularum praesertim supra intricato utrinque elevato. *Inflorescentiae* axillares vel complures pseudoterminales, more generis late pyramidalis-thyrsoideae et valde floriferae, usque 26 cm. longae atque 18 cm. latae, ubique minute sed satis dense pubescentes, rhachi ramulisque angulatis; bractae ramos ramulosque subtendentes late breviter ovatae, 0·5–1 mm. longae. *Flores* viridi-albi, masculi tantum visi, complures in glomerulos aggregati, subsessiles (pedicello crasso brevissimo), bractea semiorbiculari bracteolisque binis ovatis circiter 0·5 mm. longis subtenti. *Sepala* 5 imbricata, late ovato-suborbicularia, rotundato-obtusa, ciliolata, circiter 0·5 mm. longa atque 0·75 mm. lata. *Petala* 5, ovato-elliptica, 1·5–2 mm. longa, 0·8–1 mm. lata. *Stamina* 5, filamentis 1·6–2 mm. longis; antherae 0·5 mm. longae. *Ovarii rudimentum* sulcatum, e carpidiis 3 approximatis stigmatibus sessilibus compositum.

BRITISH GUIANA. Supenaam River, in mixed forest at foot of brown sand slope, 1931, *Davis* in *Forest Dept.* no. 1053 (typus): tree 100 ft. high, flowers greenish-white. Apoteri, Rupununi River, June 1931, *Davis* in *Forest Dept.* no. 2064: tall tree about 120 ft.

*Syn: *Zanthoxylum Krukovii* A. C. Smith in Bull. Torr. Bot. Club, **60**, 358 (1933)

high and 20 in. diam., in miscellaneous (*Swartzia*) forest ; branches very thorny. Another collection apparently referable to this species is *Davis* in *Forest Dept.* no. 2157, Simuni Creek, Rupununi River, Aug. 1931 : tree about 90 ft. high and 12 in. diam., on a very low gentle slope in Balata forest ; flowers pale green ; branches slightly thorny ; leaves without thorns. This collection, which also bears male flowers only, has somewhat larger floral parts, the petals being 2·5 mm. long and 1·3 mm. wide, and the filaments 2·5 mm. long.

Vernacular name, *Sada* (Arawak).

OLACACEAE.

Minquartia guianensis Aubl.—*Secretania loranthacea* Müll. Arg.

Apoteri, Rupununi River, June 30th, 1931, *Davis* in *Forest Dept.* no. 2063 : tree about 100 ft. high, 16 in. diam., with rather fluted bole with narrow window-like slits, growing on yellowish sandy clay soil in miscellaneous forest with Balata, on summit of a low hill ; calyx rusty brown ; corolla creamy-white. Demerara River, May, 1887, *Jenman* 3927 ; noted as "*Crucaballi*." This collection was found in the indeterminatae of the Kew *Sapotaceae*.

Distr. Panama to Guiana and Amazonian Brazil.

ICACINACEAE.

Poraresia anomala Gleason, ex descr.

Mazaruni Station, Oct. 26th, 1932, *Davis* in *Forest Dept.* no. 2327 : tree about 60 ft. high and 6 in. diam., in miscellaneous forest ; fl. white.

Distr. Amazonian Brazil.

This very peculiar genus was described by Dr. Gleason as recently as 1931 in *Bull. Torr. Club*, **58**, 385. The type material was collected by the Tyler-Duida Expedition at Santa Isabel on the Rio Negro. The characters are unmistakable, and one is led to wonder if some author has not previously given the genus a less satisfactory position in some different family. No less than two old *Glaziou* collections at Kew, nos. 8306 and 9708, have been unearthed which are clearly referable to the same plant, but these numbers have not been traced in the *Olacaceae* of *Glaziou's* "Liste."

SAPINDACEAE.

Talisia furfuracea *Sandwith*, sp. nov.; *T. hexaphyllae* Vahl affinis, ramulis foliorum petiolo rhachi petiolulis foliolorum costa nervisque subtus necnon pagina dense furfuraceo-ferrugineo-puberulis, nervis foliolorum lateralibus numerosioribus, rete venularum minus intricato, inflorescentiis ex axillis foliorum in ramis junioribus exorientibus, ungue petalorum brevior differt ; a *T. clathrata* Radlk. indumento supra commemorato, praeterea acumine foliolorum multo brevior neque caudato, nervis lateralibus magis horizontaliter patentibus, rete venularum utrinque intricatior atque prominentior venulis ultimis utrinque obviis (haud tantum tenuiter satis laxo clathrato) differt.

Arbor excelsa ; ramuli summi juniores velut foliorum petiolus rhachis foliolorum petioluli costa nervique subtus necnon pagina (haec sparsius atque minutius) pube ferruginea furfuracea minuta densa saepe subtomentella sed facile deterili obtecti, subteretes, tenuiter sulcati et rimoso-striati. *Folia* paripinnata, usque 47 cm. longa, sed summa tantum usque 17 cm.; petiolus 7.5–11.5 cm. (folii summi 4.5 cm.) longus, subteres, crebre leviter sulcatus ; internodia rhacheos 3.5–4.5 (foliorum summorum 1.8–2 cm.) longa, supra leviter anguste saepe obscure canaliculata ; petioluli crassi, transverse corrugulati, 4.5–6.5 mm. longi, circiter 3 mm. lati (in folio summo 3–3.5 mm. longi, usque 2 mm. lati) ; foliola 3–4-juga, opposita, elliptico-oblonga, summa oblanceolato-oblonga vel oblanceolata, apice sensim vel satis abrupte acuminata, acumine basi lato vulgo 4–8 mm. longo sed in foliolis parvis multo brevior, basi obtusa vel subrotundata rarius in foliolis summis parvis acute cuneata, 10–17 cm. longa, 4.2–6 cm. lata, folii summi parvi 5.6–9 cm. longa, 2.4–3.3 cm. lata, coriacea marginibus revolutis, adulta etiam saepius subbullata, supra nitidula pallide olivaceo-viridia glabra nisi costa brunnea acuta prominula basin versus minute puberula, subtus costa nervisque valde prominentibus conspicue ferrugineis pagina siccitate flavescenti-viridi indumento supra descripto, nervis lateralibus primariis utrinsecus costam 16–18 supra planis angulo lato exorientibus patulis et prope marginem anastomosantibus, rete venularum intricato supra tenuiter laxe clathrato sed etiam venulis ultimis immerso-elevatis obviis subtus omnino prominulo. *Inflorescentiae* e thyrasis apicem ramulorum versus apud folia axillaribus fasciculatis compositae ; thyrsi pyramidales, 10–20 cm. longi, ubique pallide fulvi, pubescentes et puberuli, rhachi angulata, ramis patulis vel ascendentibus ; dichasia breviter pedunculata, prope basin velut pedicelli glandulis binis sessilibus praedita ; pedicelli circiter 2 mm. longi, supra bracteolas articulati ; bracteolae supra glandulas posita, subulatae, circiter 2 mm. longae. *Flores* albi, masculi tantum visi. *Calyx* ultra medium divisus ; lobi ovato-elliptici, obtusi, 3.25–3.8 mm. longi, 2–2.25 mm. lati, extra pubescentes atque ciliati. *Petalorum* unguis ad 1.75 mm. longus, sursum sensim dilatatus, extra adpresse pilosus, intus glaber ; lamina triangulari-ovato-lanceolata, 3 mm. longa, 1.8 mm. lata, glabra ; squama laminam fere aequans, extra apice pilosulo excepto glabra, intus dense villosa. *Discus* crassus, cupularis, pentagonolobatus, circiter 1 mm. altus, vertice dense inferne sparsius pubescens. *Stamina* 8, glabra ; filamenta inaequalia, 1.75–3 mm. longa ; antherae ovato-oblongae, apiculatae, circiter 0.8 mm. longae.

BRITISH GUIANA. Mazaruni Station, March, 1934, *Davis* in *Forest Dept.* no. 2352 (typus) : tree about 100 ft. high and 18 in. diam., slightly buttressed, with silvery-scaly bark and dense compact crown, a relict of former mixed forest in burnt forest on yellow sand ; flowers white ; calyx pale green.

Vernacular name, the black kind of *Moroballi* (Arawak).

The name *Moroballi* is also given to the very distinct *T. squarrosa* Radlk., which has only one pair of leaflets; a third British Guiana representative of the genus, *T. hemidasya* Radlk., again differs very widely from the present species on account of the densely fulvous-pilosulous inflorescence with an admixture of numerous gland-tipped hairs; while a fourth, *T. elephantipes* Sandwith, recently collected on the Cuyuni River by Mr. T. G. Tutin, has immense leaves with an extraordinarily swollen base to the petiole, many pairs of leaflets and a glabrous disk.

Matayba oligandra Sandwith, sp. nov.; species ob stamina constanter 4-6 (plerumque 5) valde insignis, foliolorum numero forma necnon venatione versus *M. oppositifoliam* (A. Rich.) Britton atque *M. peruvianam* Radlk. spectans, ab illa floribus petaliferis, ab hac magnitudine formaque foliorum foliolorumque statim distinguatur.

Arbor parva, vel si cl. Jenmano credite nonnunquam excelsa, ramulis summis hornotinis crebre lenticellatis pube tenuissima densa pallide fulva vel cinnamomea obtectis. *Folia* 20-40 cm. longa, ut videtur spurie imparipinnata ob rhachin apice ultra foliola terminalia productam, petiolo rhachique tenuibus 1-2 mm. tantum diametro teretibus satis dense pubescentibus pallide fulvis; petiolus 4.2-8.2 cm. longus; internodia rhacheos 2.5-4.5 cm. longa; petioluli pubescentes, supra canaliculati, 3-6 mm. longi; foliola 5-7-juga, alterna vel opposita, oblonga vel oblongo-lanceolata vel ima fere ovata, apice insigniter 0.5-1.5 cm. abrupte caudato-acuminata, basi inaequilateraliter cuneata, ima nonnunquam tantum 3.5 cm. longa et 1.5 cm. lata, cetera 5-10.5 cm. longa, 2-3.8 cm. lata, chartacea, integra, siccitate supra olivacea vel nigrescentia subtus saepe plumbea vel purpurascentia, supra costa nervisque principalibus minute sed satis dense pubescentia, subtus costa pubescente et pagina tota pilis parvis parcis regulariter adspersa, nervis lateralibus parallelis e costa numerosissimis, secundariis e primariis (his circiter 10-12) vix distinguendis, omnibus cum rete venularum intricato praesertim infra prominulis, costa ipsa supra prominula vel subimpressa subtus valde prominente. *Inflorescentiae* axillares vel pseudo-terminales, pyramidali-thyrsoideae, ubique pallide tenuiter fulvo-tomentellae vel dense pubescentes, ad 20 cm. longae, ramis gracilibus inferioribus 4-12 cm. longis, rhachi ramisque angulato-sulcatis, cymis breviter pedunculatis 1-3-floris; pedicelli 1-1.8 mm. longi (in cymis unifloris pedunculus cum pedicello 2-3.75 mm. longus); bracteae bracteolaeque minutae, ovatae vel oblongae, obtusae. *Flores* pentameri, siccitate 3-4 mm. diametro. *Calyx* forma generis propria. *Sepala* ovata, acuta vel apiculata, 1.2-1.3 mm. longa, 0.75-1.1 mm. lata, extra sparse puberula, conspicue ciliata. *Petala* obovata, saepe apiculata, unguiculata, 1.75-1.9 mm. longa, lamina 0.8-1 mm. lata extra glabra intus pilosa praeterea conspicue ciliata, apice unguis squamis binis liberis utrinque villosis obliquiter obovoideo-oblongis lamina ipsa brevioribus ac angustioribus in-

structa. *Stamina* vulgo 5, rarius 4 vel 6, filamentis 2·2–3 mm. longis vel in floribus superfemineis brevioribus, triente inferiore incrassatis villosis superne glabris; antherae glabrae, reniformes, vix 0·5 mm. attingentes. *Discus* glaber, tumide annularis, vix 1·5 mm. latus, umbilicato-excavatus. *Ovarium* stipite crasso glabro 1·2–1·4 mm. longo 0·6–0·85 mm. lato post florem lapsum mox elongato suffultum, ovoideum, trigonum vel subcompressum haud trigonum, 1·2–1·5 mm. longum atque latum, superne flavo-pubescent, triloculare, loculis uniovulatis; stylus 1·75–2 mm. longus, apice subinteger, parce pubescens. *Ovarii rudimentum* in flore masculo simile sed omnibus partibus minoribus. *Fructus* non visus.

BRITISH GUIANA. Macouria Creek, near Bartica, Essequibo River, March, 1934, *Forest Dept.* no. 2354 (typus): a small tree or bush common in a low type of forest found near creeks. Opposite Bartica, April, 1887, *Jenman* 3637; noted as a "large tree." Demerara River, April, 1887, *Jenman* 3620; March, 1898, *Jenman* 7315.

This very interesting tree seems to have all the characters as well as the facies of a true *Matayba*, with the exception of its constant oligandry, a phenomenon which marks it as an anomalous and presumably retrogressive species. The fruit has not yet been collected.

Vernacular name (Arawak), *Kuleshiri*, "but not the Kuleshiri of high forests."

LEGUMINOSAE.

***Machaerium* (*Drepanocarpus*) *trifoliolatum* Ducke.**

Bartica, Nov., 1888, *Jenman* 4745, agreeing perfectly with *Ducke* 17188.

Distr. Amazonian Brazil (Pará).

***Dinizia excelsa* Ducke.**

Simuni Creek, Rupununi River, a few miles N. of the Kanaku Mountains, Aug., 8th, 1931, *Davis* in *Forest Dept.* no. 2119: a very large tree, 150 ft. high, 34 in. diam., with large wide-spreading crown, and moderately buttressed; bark rather scaly, brick-red when the scales have fallen; a common species in miscellaneous forest, showing a tendency to be gregarious.

Vernacular name, *Parakwa* (Wapisiana).

Distr. Amazonian Brazil (States of Amazonas and Pará).

This splendid tree was first described by Dr. Ducke in 1922 in *Arch. Jard. Bot. Rio de Janeiro*, **3**, 76, t.4, and the floral structure and fruit were figured in 1930 in vol. **4** (t.11) of the same publication. The genus was placed in the *Mimoseae* next to *Stryphnodendron*, but its strongly imbricate petals would suggest its closer affinity with the *Caesalpinieae* amongst the genera on the border of the two tribes. Dr. Ducke, however, whose knowledge of the Amazonian flora has never been equalled, writes reaffirming his confidence in the relationship of *Dinizia* with *Stryphnodendron*, *Piptadenia* and *Pentaclethra*

in the *Mimoseae*. This is one of the largest trees of "hylaea" and is known in Brazil by the names "Angelim" and "Faveira." Dr. Ducke records it from siliceous-clayey or clayey soils in the highest virgin forests of the Rios Mojú, Xingú, Tapajós and Trombetas, and from the islands of Breves, in the state of Pará; and from Maués and Manáos in the state of Amazonas.

ROSACEAE.

Moquilea riparia Gleason.

Southern slopes of the Kanaku Mountains, near the right bank of the Rupununi River, c. 1400 ft., Oct. 29th, 1931, *Davis in Forest Dept.* no 2250: tree about 100 ft. high and 18 in. diam., on a steep mountain slope in miscellaneous forest; flowers cream, with the centre and the ovary creamy-pink. Compared with *Krukoff* (coll. Froes) 1961.

Distr. Amazonian Brazil.

Licania grisea Kleinh., ex descr.

François Creek, Mahaicony River, March 23rd, 1934, *Davis in Forest Dept.* no. 2365: tree about 90 ft. high and 16 in. diam., in mixed forest on brown sand; bole smooth, grey, tending to be fluted at the base; flowers cream.

Vernacular names, "Iron Mary," *Unikiakia* (Arawak), large kind.

Distr. Surinam.

Hirtella Davisii Sandwith, sp. nov.; staminibus 3, forma foliorum inflorescentiaequae *H. triandrae* Sw. certe affinis, sed bracteolis rotundatis glandulis multis breviter stipitatis marginatis primo visu distinguitur; *H. ciliata* Mart. et Zucc., quae bracteolis satis similibus gaudet, forma foliorum staminibus 6 valde discrepat; *H. Ulei* Pilger forma inflorescentiae necnon bracteolarum, staminibus pluribus differt.

Arbor parva, ramulis summis (annotinis tantum visis) cinereis crebre lenticellatis, glabris vel apice parce pilosis. *Stipulae* anguste subulatae, circiter 3.5 mm. longae. *Folia* lanceolata vel oblongo-lanceolata, apice sensim acuminata, basin versus attenuata sed basi ipsa rotundata, nonnunquam levissime cordata, rarius cuneata, 7.7–13 cm. longa, 2.3–4 cm. lata, tenuiter coriacea, utrinque satis nitida costa nervisque brunnescentibus, supra glabra asperula, subtus glabra vel nervis parcissime pilosula sed basibus tuberculatis (cf. *H. triandram*) pilorum caducorum crebre adspersa, nervis primariis utrinsecus circiter 10 ascendentibus ac arcuato-anastomosantibus, his cum costa supra prominulis subtus prominentibus, rete venularum supra intricatissimo prominulo (minus quam in *H. Ulei*, magis quam in *H. triandra*) subtus impresso; petiolus 3–4 mm. longus, pilosus vel glaber. *Inflorescentiae* axillares, 4–13 cm. longae, vix ad 3 cm. latae, paniculatae, ubique pilis stramineis satis dense breviter pilosae; bractae anguste triangulari-lanceo-

latae, 2-3 mm. longae, basi 1 mm. vel paulo ultra latae, basi tantum marginibus glandulis paucis sessilibus vel subsessilibus instructae; bracteolae late ovato-semicirculares, circiter 1-1.5 mm. latae, sparse pilosae, margine glandulis multis breviter stipitatis vel nunquam subsessilibus fimbriatae, praeterea et pagina glandulis sessilibus hic illic instructae; pedicelli supra bracteolas summas 2.5-5 mm. longi. *Calycis* tubus circiter 2 mm. longus, siccitate nigrescens atque vulgo satis sparse pilosus; lobi ovati vel ovato-suborbiculares, apice rotundati, mox reflexi, extra sparse pilosi et puberuli, intus dense griseo-pulverulento-puberuli. *Petala* alba, ovata vel suborbicularia, apice rotundata, 3-4 mm. longa, 2.5 mm. lata. *Stamina* 3, glabra, filamentis 1.1-1.3 cm. longis. *Ovarii* vertex dense villosus; stylus basin versus sparse pilosus, 1-1.4 cm. longus. *Fructus* desideratur.

BRITISH GUIANA. Near Oko Creek, Cuyuni River, March 1933, *Davis* in *Forest Dept.* no. 2345 typus: a small tree about 40 feet high and 4 in. diam., in mora forest; flowers white; calyx, upper half of filaments and style purplish-mauve.

The facies of the bracteoles and of the whole inflorescence of this tree is very similar to that of *H. ciliata* (including *H. rubra* Benth.), but the most nearly related species is almost certainly *H. triandra*.

LECYTHIDACEAE.

Eschweilera holcogyne *Sandwith*, sp. nov.; floribus subsessilibus, calycis tubo in articulo sessili valde incrassato et ob sulcos de sinibus sepalorum descendentes conspicue 6-lobato notabilis; ab *E. simiorum* (Ben.) Eyma ac *E. congestiflora* (Ben.) Eyma foliis parvis sepalis minoribus forma galeae androecii, ab *E. Wachenheimii* (Ben.) Sandwith forma foliorum sepalis petalisque multo majoribus petalis externis haud puberulis, ab *E. chartacea* (Berg) Eyma nervis primariis lateralibus paucioribus sepalis petalisque multo majoribus, ab *E. valida* (Miers) Ndz. (? *Lecythis elliptica* H. B. K.) forma foliorum nervis lateralibus paucioribus inflorescentia multo minore sepalis majoribus facile distinguenda; *E. ovalifolia* (DC.) Ndz. characteribus foliorum omnino discrepat.

Arbor excelsa, c. 30 m. alta; ramuli summi tenuiter crebre striati sulcatique, lenticellati. *Folia* oblonga, elliptica vel elliptico-oblongata, apice sensim ad 1 cm. vulgo acute acuminata, basi cuneata vel obtusa fere rotundata et abrupte in petiolum decurrentia, 6.5-13 cm. longa, 2.4-6.8 cm. lata, subintegra sed obscure late sinuato-crenata, glabra, firme chartacea vel subcoriacea, siccitate vulgo utrinque olivascens-plumbea vel brunnescentia, utrinque nitidula, costa utrinque praesertim subtus prominente, nervis primariis lateralibus utrinsecus 7-10 (vulgo circiter 8) arcuato-ascendentibus et longe a margine anastomosantibus supra fere planis subtus prominentibus, rete venularum intricato supra subtili sed manifesto fere plano subtus prominulo valde obvio; petiolus alatus, supra canaliculatus, 5-10 mm. longus. *Inflorescentiae* axillares (? et terminales), simplices vel basi ramosae, congestiflorae,

breves, 1.5–3.2 cm. longae (an nonnunquam longiores?), post florum lapsum articulis pedicellorum brevissimorum valde cicatricosae necnon corrugulatae, glabratae. *Bracteae* bracteolaeque non visae. *Flores* in articulo sessiles. *Alabastra* aperientia ad 2.2 cm. diametro. *Calycis* tubus circiter 1 cm. (siccitate 7–8 mm.) latus, 2–4 mm. altus, crassus, cupularis, conspicue anguste longitudinaliter sulcatus atque 6-lobatus, ceterum laevis, glaber; sepala oblonga vel oblongo-ovata, apice rotundata, 6.5–10 mm. longa, 5–7 mm. lata, basi imbricata, glabra vel dimidio superiore minute ciliolata. *Petala* alba, oblonga, superne ciliolata, ceterum glabra, 2.3–3.3 cm. longa, 1.4–1.8 cm. lata. *Androecii* stamina in annulo circa ovarium numerosissima, filamentis sub antheris clavato-dilatatis, latere galeae longiora et ad 6 mm. longa; galea supra ovarium inflexa sed haud spiraliter incurvata, superne parte inflexa valde incrassata, intus appendicibus sterilibus deorsum (basin versus) directis oblecta. *Ovarium* semiinferum, 4–5-loculare, loculis pluriovulatis, vertice late subconico leviter pluriusculato vix 7 mm. diametro; stylus ad 3.5 mm. longus. *Fructus* haud visus.

BRITISH GULANA. Kartabo Road, near confluence of Cuyuni and Mazaruni Rivers, Feb., 1931, *Davis* in *Forest Dept.* no. 1019 (typus): tree about 100 ft. high, 14 in. diam., on brown sandy loam on hill slope in mixed forest; flowers white, staminal column pale yellow, strongly scented. Near Kurupukari, Essequibo River, July, 1920, *Hohenkerk* in *Forest Dept.* no. 842.

Vernacular name, *Howdan* (Arawak).

The measurements of the floral parts are taken from the excellent spirit material of the type collection which was preserved by Mr. Davis. The specific epithet refers to the conspicuously furrowed calyx tube. The androecium hood appears to be of the same type as that of *E. amara* (Aubl.) Ndz., see Eyma, *Polygonaceae, Guttiferae* and *Lecythidaceae* of Surinam, pp. 184, 196, fig. 9 (1932).

Eschweilera praeclara *Sandwith*, sp. nov.; floribus subsessilibus, calycis tubo crasso lato in articulo semper sessili, ceterum *E. chartaceae* (Berg.) Eyma affinis sed forma foliorum, rhachi inflorescentiae rigida crassa conspicue striata atque verruculosa, sepalis suborbicularibus differt; ab *E. valida* (Miers) Ndz. nervis foliorum paucioribus, inflorescentia minus valida striata atque verruculosa, floribus minoribus recedit; ab *E. Wachenheimii* (Ben.) Sandwith foliis subtus haud glaucescentibus multo minus prominenter reticulatis, sepalis petalisque majoribus, petalis exterioribus haud extra griseo-puberulis, ovario quadriloculari valde distincta; ab *E. ovalifolia* (DC.) Ndz. foliis parvis, sepalis magnis statim distinguitur.

Arbor excelsa vel satis parva; ramuli summi conspicue striati sulcatique, lenticellati. *Folia* elliptica, oblonga, obovato-oblonga vel oblanceolata, apice acute acuminata vel cuspidata, basi longe acute vel abrupte cuneata et in petiolum decurrentia, 8–14.5 cm.

longa, 3·3-6·3 cm. lata, subintegra, glabra, costa subtus minutissime puberula excepta, plus minusve coriacea marginibus leviter revolutis, siccitate supra viridia vel olivaceo-nigrescentia subtus pallide viridi-brunnea vel viridi-plumbea, utrinque saepius plus minusve nitidula, costa supra prominula subtus valde prominente, nervis lateralibus primariis utrinsecus vulgo circiter 12 ascendentibus et satis longe a margine anastomosantibus supra fere planis subtus prominulis, rete venularum laxè intricato supra fere plano vel subimpresso manifesto sed haud obvio subtus tenuissime manifeste prominulo ; petiolus alatus, supra canaliculatus, minutissime puberulus, 5-8 mm. longus. *Inflorescentiae* axillares et terminales, racemis apice ramulorum paniculatis, singulis ad 13 cm. longis (saepe multo brevioribus), rhachi crassa saepius flexuosa congestiflora dense puberula lariciformi corrugulato-sulcata necnon crebre verruculoso-lenticellata praeterea post florum lapsum articulis pedicellorum brevissimorum crassis valde cicatricosa. *Bracteolae* ovato-suborbiculares, puberulae, 1·5-2 mm. longae atque latae, cito caducae. *Flores* in articulo sessiles. *Alabastra* aperiencia siccitate 7-8 mm. diametro. *Calycis* tubus 4-5 mm. latus, 1·5-2 mm. altus, crassus, cupularis, infra sinus sepalorum plus minusve late excavatus sed haud regulariter longitudinaliter sulcato-lobatus, dense minute puberulus, levissime corrugulatus et verruculosus ; sepala suborbiculari-ovata, extra minute puberula et ciliolata, inaequalia, basi imbricata, 3-4 mm. longa atque lata. *Petala* lactea vel crenea atque roseo-suffusa, obovato-oblonga, sparse ciliolata, ceterum glabra, inaequalia, 1·1-2 cm. longa, 0·7-1·3 cm. lata. *Androecii* stamina in annulo circa ovarium numerosissima, filamentis sub antheris leviter dilatatis, longiora circiter 4·5 mm. longa ; galea pallide flava, supra ovarium inflexa sed haud spiraliter incurva, parte inflexa incrassata appendicibus sterilibus margine apicali porrectis intus deorsum (basin versus) directis oblecta (raro haud incrassata appendicibus plane nullis). *Ovarium* subinferum, 4-loculare, loculis pauciovulatis (ovulis in quoque loculo haud usque 10), vertice primum plano vel fere depresso striato-sulcato mox supra fructum maturescentem elevato-subconico ; stylus circiter 2 mm. longus. *Fructus* maturus haud visus, juvenis parte infra zonam sepaliferam crebre brunneo-lenticellata sublaevi vertice late conico nigrescente.

BRITISH GUIANA. Northern side of the Kanaku Mountains, about 10 miles east of the Takatu River, 450-800 ft., Sept.-Oct., 1931, *Davis in Forest Dept.* nos. 2190 and 2199 (typus). No. 2199 was a large tree 100 ft. high and 18 in. diam. on a steep rocky mountain slope in miscellaneous forest ; flowers cream with a faint pink blush, staminal plate pale yellow. No. 2190 was a small tree 42 ft. high and 6 in. diam. in miscellaneous forest (with *Kokerite*, *Maximiliana* sp.) fringing the foot of the mountains ; flowers milk-white, staminal plate pale yellow, calyx green.

Vernacular name, *Howdan* (Arawak) ; this name is also given to the very distinct *E. holcogyne*.

E. Schomburgkii (Berg) Ndz.—*Chytroma Schomburgkii* Miers.

Lower part of Simuni Creek, Rupununi River, Aug., 1931, *Davis* in *Forest Dept.* no. 2159: a small tree about 20 ft. high and 3 in. diam., in low fringing forest near the bank of the creek, with savannah behind; flowers white, staminal plate tipped with yellow.

Distr. Endemic. Robert Schomburgk first discovered it in August by the skirts of savannahs and, from the evidence of the Kew Herbarium, the species has not been re-collected since his later expeditions with his brother.

Couratari fagifolia (Miq.) Eyma—*Lecythis fagifolia* Miq. ap. Berg. *Allantoma fagifolia* (Miq.) Miers.

Southern side of Kanaku Mountains, on right bank of Rupununi River near Sand Creek, c. 1,200 ft., Oct., 1931, *Davis* in *Forest Dept.* no. 2242: a large tree 120–130 ft. high and 24 in. diam. with buttresses to 10 ft. or higher, in miscellaneous forest on a steep slope; branches with flowers leafless; flowers pale pink, calyx deep red.

Vernacular name, *Wadara* (Arawak). Another *Wadara*, *C. pulchra* Sandwith, was found growing at a lower elevation near the Simuni Creek (no. 2147).

Distr. Guiana.

MELASTOMATACEAE.

Mouriri Sideroxylon Sagot ex Triana.

François Creek, Mahaicony River, March, 1934, *Davis* in *Forest Dept.* no. 2364: tree about 75 ft. high and 8 in. diam., unbuttressed, in mixed forest on brown sand soil; buds purplish-mauve; petals pale pink; stamens white, deep purple at apex; anthers purple; style white.

Vernacular name, *Mamuriballi* (Arawak.)

Distr. French Guiana.

This material differs from the only collection seen and recorded, *Sagot* 914, in the thicker leaves, in the bracteoles being placed higher on the pedicel (often near or even above the middle), and in the calyx being more distinctly divided into minutely ciliolate lobes. Further collections from Guiana are necessary before the possible variability of *M. Sideroxylon* can be estimated.

SAPOTACEAE.

Lucuma speciosa Ducke.

Mazaruni Station, Aug., 1932, *Davis* in *Forest Dept.* no. 2307: tree about 110 ft. high, 28 in. diam., in miscellaneous forest on hill slope, apparently very rare; lower surface of leaves, calyx and fruit densely covered with rusty reddish tomentum; flowers pale green. *Ibid.*, June, 1933, *Tutin* 176. Bamboo Creek, right bank of Rewa River, Rupununi District, July, 1931, *Davis* in *Forest Dept.* no. 2086: tree about 120 ft. high and 28 in. diam., common in miscellaneous forest with *Mora*, on sandy hill slope.

Distr. Amazonian Brazil (Rio Trombetas and Rio Branco de Obidos).

L. dissepala (Krause) Ducke.—*L. Duckei* Huber. *Vitellaria dissepala* Krause.

Kanaku Mountains, on southern side near Rupununi River, c. 1000 ft., Oct., 1931, *Davis in Forest Dept.* no. 2244: tree about 80 ft. high, 8 in. diam., in miscellaneous forest on hill slope; flowers pale green. Kanaku Mountains, near Nappi Creek, a tributary of the Pirara River, c. 400 ft., Oct., 1931, *Davis in Forest Dept.* no. 2219: tree about 80 ft. high, 10 in. diam., on level ground at foot of mountains in miscellaneous and Kokerite Palm forest.

Distr. Amazonian Brazil.

L. sericea Krause.

Simuni Creek, Rupununi River, a few miles N. of the Kanaku Mts., Aug., 1931, *Davis in Forest Dept.* no. 2115: tree about 80 ft. high and 12 in. diam., near the top of a low hill in miscellaneous forest; fl. pale green, calyx brown, lower surface of leaves reddish-brown.

Vernacular name, *Bakupar* (Wapisiana).

Distr. Brazil (Rio Branco).

Davis writes that this species is very abundant, especially in forests near the savannah, or in "islands" of forest in it. It coppices freely, and is common in second growth.

POLYGONACEAE.

Coccoloba mollis Casaretto.—*C. polystachya* Wedd., cum vars.

Berbice River, June, 1889, *Jenman* 5187 (coll. Mr. Bridges).

Distr. Surinam, Brazil.

LAURACEAE.

Ocotea tomentella Sandwith, sp. nov.; fortasse juxta *O. caracasana* (Nees) Mez ponenda, sed floris masculi filamentis staminum serierum exteriorum antheras superantibus, perianthii lobis obtusis rotundatis, staminodiis nullis differt.

Arbor excelsa, 30–45 m. alta; ramuli hornotini dense arcte cinnamomeo-tomentelli, crebre verruculoso-rugulosi, superne conspicue acutanguli sulcati, 6–8 mm. diametro. *Folia* petiolis supra canaliculatis, subtus convexis rugulosis, inferne circiter 1.5–1.8 cm. longis tum longe (ad 2.5 cm.) dilatato-alatis ac in laminam trans-euntibus, ubique pallide arcte tomentellis; lamina elliptica, elliptico-oblonga vel rarius obovato-elliptica, apice breviter (0.4–1 cm.) cuspidata, basi cuneata et ut supra commemoravimus in petiolum abrupte longe attenuata marginibus insigniter revolutis, 11–26 cm. longa, 5.3–10.7 cm. lata, tenuiter coriacea, supra nitida basi tomentella excepta glabra, subtus opaca ubique pallide arcte minute ochraceo- vel griseo-tomentella, costa supra plus minusve impressa subtus prominente utrinque praesertim basin versus supra verruculoso-granulata, nervis lateralibus utrinsecus vulgo 11–14 supra fere impressis subtus prominentibus arcuato-ascendentibus ac anastomosantibus, rete venularum utrinque intricato prominulo

conspicuo, areolis supra haud prominulo-granulatis sed obscure impresso-punctatis. *Inflorescentiae paniculae* corymbum amplissimum pseudoterminallem 14–25 cm. latum efformantes, anguste pyramidales, inferiores ad 19 cm. longae, ubique dense arcte minute pallide griseo-tomentellae, rhachi acutangula, ramis compressis apice 1–3-trichotomo-divisis igitur multifloris sed pedunculis cymarum cymularumque semper manifestis. *Flores* dioici, ♂ tantum visi, 5–6 mm. lati, pedicellis brevissimis, tubo manifesto subcampanulato sulcato-angulato 1.5 mm. longo apice circiter 2 mm. lato; lobi aequales, late ovato-suborbiculares vel suborbiculares, 3 mm. longi, 2.7 mm. lati, apice obtusi rotundati, extra tomentelli, intus minute pubescentes. *Staminum* series 2 exteriores filamentis antheras superantibus compresso-applanatis extra sparse pubescenti-pilosulis 1–1.2 mm. longis vix 0.5 mm. latis, antheris ovato-subrectangularibus 0.8–1 mm. longis basi 0.8 mm. latis apice truncato-obtusis atque vulgo obscure emarginatis; series tertia filamentis angulatis vel sulcatis glabris 1.3 mm. longis, antheris anguste oblongo-rectangularibus apice emarginatis circiter 1 mm. longis atque 0.6 mm. latis, loculis inferioribus extrorse superioribus lateraliter dehiscentibus, basi glandulis globosis sessilibus undulato-costatis ac excavatis 0.5–0.6 mm. diametro praedita; staminodia nulla. *Pistillum abortivum* glabrum, ovario anguste obovoideo-fusiformi ad 1.2 mm. longo 0.3–0.4 mm. lato, stylo cum stigmate 2.5 mm. longo. *Bacca* ellipsoidea, matura ad 2 cm. longa, ad 1.2 cm. lata, basi cupulae insidens; cupula hemisphaerica, 8–10 mm. alta, vulgo 1.2–1.3 cm. diametro, margine integro simplici, extra crebre rugulosa glabrescens, basi in pedicellum incrassatum 4–5 mm. longum attenuata.

BRITISH GUIANA. Arawak Matope, Cuyuni River, fl. July 17th, 1933, *Tutin* 375 (typus floris masculi in Herb. Mus. Brit., dupl. in Herb. Kew.): tree 120 ft. high, 37 in. diam., in mixed forest; has small buttresses extending 15 ft. up the trunk; leaves dark green and shining above, pale beneath, flowers white. Upper Camaria, Cuyuni River, fr. Feb. 14th, 1931, *Lockie* in *Forest Dept.* 2035 (typus fructus in Herb. Kew.): large tree, 130 ft. high, 20 in. diam., on sandy flat near creek. Tinamou Falls, Cuyuni River, fl. March 6th, 1931, *Davis* in *Forest Dept.* 1039 (Herb. Kew.): a very large tree, about 140 ft. high, buttressed, on low hill in swamp, on brown sand, in mixed forest.

Vernacular name, *Baradan* (Arawak).

A very large forest tree, at present collected only from a limited area of rain forest on the Lower Cuyuni River. The species does not run down to anything resembling it in Mez's admittedly artificial key to the genus, nor has any close affinity been found in the Kew Herbarium. It does not agree with any of the numerous species which have been described since the publication of Mez's monograph. A probable relationship may be suggested with such species as *O. opifera* Mart., *O. Kunthiana* (Nees) Mez, *O. glomerata* (Nees) Mez, and *O. caracasana* (Nees) Mez. The first three of these differ widely

and can be distinguished at a glance from *O. tomentella*. *O. caracasana* is not represented in London; it has the tomentellous lower surface of the leaf, but evidently differs specifically owing to its short outer filaments, its acute perianth lobes, and the presence in the male flowers of a conspicuous whorl of stipitiform staminodes. A peculiar and striking characteristic of all the collections of the present species is the abruptly and narrowly long-attenuate and strongly revolute base of the lamina which merges insensibly into the petiole.

XI.—FRAXINUS PALLISAE AND ITS RELATIONSHIPS. H. G. TEDD AND W. B. TURRILL.

The genus *Fraxinus* was monographed in "Das Pflanzenreich" by A. Lingelsheim, the part containing this genus being published in 1920. No mention has been found in this work of the interesting ash described (1) by A. J. Wilmott in 1916 from the Danube Delta as *F. Pallisae*. The type material (no definite type number or sheet is quoted) came from Letei, Dobruja (Dobrogea) and the varieties β . *gyrocarpus* and γ . *angustifolius* (varietas vel status), from Caraorman, Dobruja (Dobrogea). By Mr. Wilmott's courtesy the original material has been examined and compared with the more recently collected specimens discussed below. The var. *gyrocarpus* has little or no taxonomic value since contorted and not contorted (flat) fruits are now known to occur on the same tree. The var. (vel. status) *angustifolius* was apparently named from the narrow leaflets (not as the name would suggest from its having narrow leaves) and represents one of a large number of variations in leaflet shape, which are usually to be found in populations of *F. Pallisae*.

Apart from its occurrences in the Danube Delta, *F. Pallisae* has been recorded from eastern Bulgaria, both north and south of the Stara Planina ("the Balkans" of some English maps). It occurs in the Longos forest which occupies the valley of the river Kamtschija (Kamčija) whence it was recorded and figured by Mattfeld (2). Stojanoff, in a very clear account of the vegetation of this area (3 and 4), records the plant as occurring in an association dominated by *Alnus glutinosa* Gaertn. (33·3 per cent.) but found (an average of five surveys) it represented only 0·5 per cent. of the trees and tall shrubs. It may be noted that *Fraxinus oxyphylla* M. Bieb. had a percentage occurrence of 4·7 in the same community. Stojanoff notes that ecologically and floristically nearly similar woods (though, so far as was then known, without *F. Pallisae*) occur in eastern Macedonia and in western Thrace. He states that they all occur, except those in the Strandja district, in damp to marshy ground under continental climatic conditions. The word Longos is used by Bulgarian foresters to designate stream- or river-woodland with numerous woody lianes and is defined botanically as "einen an Holzlianen reichen, gemischten Auwald, der auf nassen Boden und bei ziemlich kontinentalen klimatischen Ver-

hålnissen im Osten der Balkahalbinsel vorkommt." Mattfeld (5, p. 18 footnote) has some interesting remarks on the history of the word in the Slav languages. Stojanoff says that these river-side woodlands must represent an ancient type and have been formerly much more widely distributed in Bulgaria, Thrace, and Macedonia than they are now.

In the Strandja (Strandza) area in south-eastern Bulgaria, the portion on the Turkish side of the border has not been explored botanically. *F. Pallisae* is given by Stefanoff as a constituent of the river-shore woodlands on the Bulgarian side of the boundary, along with *F. oxyphylla* and many other woody plants (6, p. 32). These woods also occur on damp soil (they are said by Stefanoff to be "edaphic formations") and to have as characteristics quick and varied development of the tree flora, presence of a large number of climbing plants (including such woody ones as *Periploca*, *Smilax*, and *Vitis*) and poor development of the grassy undergrowth. Mattfeld (5 p. 19) also describes the vegetation of the valleys in south-eastern Bulgaria and in plate IV of his paper a photograph is reproduced showing a longos wood in the Tschilingos dere with *Alnus glutinosa*, *Fraxinus oxyphylla* (*F. oxycarpa*), *F. Pallisae*, *Populus tremula*, *Prunus divaricata*, *Pirus malus pumila*, *Vitis silvestris*, *Smilax excelsa*, *Clematis vitalba*, and *Pteridium aquilinum*. The forest vegetation of the Strandja, consisting, in addition to the longos woods, of subxerophilous communities and mesophilous forest with *Fagus orientalis* and a mixture of other Pontic trees and shrubs, is very rich floristically but does not further concern us here (see 1, p. 139).

A preliminary note has been published (7) recording the occurrence of *Fraxinus Pallisae* in western Thrace, in the delta of the River Mesta. The importance of this discovery becomes evident in the discussion which follows.

In addition to the material quoted by Wilmott, which is in the British Museum (Natural History) herbarium, the following specimens (all at Kew) have been examined:

Bulgaria: Istrandja (or Strandja) Dagħ, *Stoyanoff and Stefanoff* 906. Also fruits received in 1932.

Dobruja: distr. Tulcea. In silvis mixtis in dunis maritimis arenosis ad Letea in Delta Danubii, alt. cca. 1-5 m., 14 Jul., 1923 *A. Borza*, Fl. Rom. exsicc. 760.

W. Thrace: Boyadjiler, 25.5.1934, two sheets of miscellaneous collection of leaves, *Tedd* s.n. Boyadjiler, 16.10.1933, leaves and shoots showing fungus attack on ash leaves, very common in some localities and apparently causing premature leaf fall and possible damage to the trees. The fungus has been identified by Dr. Buisman as *Phyllactinea corylea* (Pers.) Karst.

Bekki Ovasi, copse, relict of delta forest of R. Mesta, 8.7.1933, No. 1096. From a tree about 30 feet high.

Bekki Ovasi, edge of copse, wettish land (but now very dry), specimens gathered 20.2.1934 and flowered in water 28.2.1934, No. 1320. Tree about 30 feet high. Leaves collected 12.6.1934.

Bekki Ovasi, edge of copse, 12.3.1934, No. 1321. Young tree, about 15 feet high. Leaves collected June, 1934.

Bekki Ovasi, grassland near copse, in remains of hedge, 12.3.1934, No. 1322. Leaves collected 12.6.1934. The infructescences are much galled (probably following insect attack) and little fruit was produced. That which was collected is well formed and ranges from flat to much twisted (i.e. type and var. *gyrocarpus* fruits occurred on the same tree).

Karakeuy, hedge of trees, or windbreak around swampy grass field, 30 m., 9.3.1934, No. 1323. Young tree, about 25 ft. high. Leaves collected 12.6.1934.

Karakeuy, 30 m., 9.3.1934, No. 1324. Young tree, about 25 feet high. Leaves collected June, 1934.

FIELD NOTES ON *FRAXINUS PALLISAE* WILMOTT, AS
OCCURRING IN W. THRACE.

Fraxinus Pallisae Wilmott first came under observation in W. Thrace as a constituent of a small copse near the village of Bekki Ovasi in the S.W. part of the Xanthie district. The village lies on a flat sandy plain, and is about 5 miles E. of the River Mesta (Nestos or Kara-Sou) and some 8 miles from its mouth. Search has subsequently shown the species to occur in other localities near Xanthie, and such localities may be classed under three fairly distinct types :

- (1) "Forest relicts" in the lower Mesta region, and in the forest fringing the lower reaches of the river, i.e. after its debouchment from the mountain gap.
- (2) Small woods of elm and oak, often near water, usually sluggish streams.
- (3) Open woods (park type) of elm and oak, near streams and wet places.

All of the above localities have in common a wettish and usually sandy soil, with a fair amount of clay and humus. The species has not so far been observed in the mountain or hill districts, though search has been made, and seems to be confined to the flat shelf between the Rodope Mountains and the Aegean Sea.

This ash is seldom seen growing in isolated positions ; on the other hand it seeds freely, and ash seedlings are fairly numerous on the humus floor of the copse in which it is most frequent, so it is possible that grazing by cattle and goats is the factor which decides the gregarious habit. When cut down the tree suckers freely, the leaves of the suckers being usually larger, and with more leaflets than on the straight-grown tree.

To consider the above habitats in some detail—

1. (a)—The forest fringing the R. Mesta is principally composed of species of poplar (*P. canescens* Sm., with *P. nigra* L. occasionally),

together with various species of *Salix* and *Alnus glutinosa* Gaertn. near the water's edge. The soil is mostly sandy, with stretches of clay overlaying the sand, and this retains much moisture throughout the year, seldom becoming really dry. The poplar-willow consociation alternates with areas of *Salix*—*Alnus glutinosa* Gaertn.—*Rhamnus frangula* L., in a more open community; but both *Fraxinus oxycarpa* Willd. and *F. Pallisae* are here comparatively infrequent. The *Populus*-*Salix* sections have a very heavy undergrowth of climbing shrubs, *Smilax excelsa* L. being dominant in this stratum, together with *Vitis silvestris* Gmel., *Periploca graeca* L., *Humulus lupulus* L. and occasionally *Clematis vitalba* L. var. *crenata* Rouy et Fouc. Other shrubs are *Rhamnus frangula* L., *Cornus mas* L., *C. sanguinea* L., *Rubus* spp. Trees of elm of the *Ulmus nitens* group (see 8) and *Quercus pedunculiflora* K. Koch occasionally occur also. In clearings amongst the trees the cultivated crops are usually beans, maize, and cucurbits, among which common weeds observed in September are *Solanum nigrum* L., *Echinochloa crus-galli* L., and *Xanthium italicum* Mor.

1 (b)—Forest "relicts" at a greater distance from the river occur in the form of small woods or copses, usually near a slow stream and have the appearance of oases in a wide stretch of flat sandy plain. Some idea of their character may be gained from the fact that they are a favourite haunt of woodcock in early winter. The soil is more argillaceous as is evidenced by frequent brick-pits (sun-baked), and the *Populus*-*Salix* consociation seems to give way to one of poplar with ash, or of oak and elm with poplar. Two areas near Bekki Ovasi are typical:

(i) In the eastern part of these copses are the two species of *Fraxinus* (*F. oxycarpa* Willd. and *F. Pallisae* Wilmott), *Populus canescens* Sm., *Ulmus nitens* Moench and *Quercus pedunculiflora* K. Koch, the latter only occasional. The undergrowth of *Smilax excelsa* L. is remarkably dense and almost impenetrable but certain species seem to make headway against it, notably *Cornus sanguinea* L. and *Crataegus monogyna* Jacq., while ash and elm seedlings are to be met with, even in the dense parts. The frequency of elm seedlings is quite remarkable, though, unless the young plants are dug up, it is a matter of difficulty to establish whether they are seedlings or suckers, the latter also being quite plentiful.

This is the section in which *Fraxinus Pallisae* occurs in the greatest numbers, about equally with *F. oxycarpa*, the two being frequently locally co-dominant; the two species can be readily distinguished after a little practice, *F. Pallisae* having the lighter foliage on account of the indumentum, and in this particular locality it shows the autumn tints earlier, while *F. oxycarpa* is still green, although this statement does not hold good in general. In places here *F. Pallisae* has grown into a fair sized tree perhaps 30 ft. high, with a graceful rounded crown about 20 ft. in diameter; the trunk of such a specimen may exceed 2 ft. in diameter at 5 ft. from the ground level.

In such communities as this the villagers often drive paths through the dense undergrowth in order to cut firewood, the poplars being frequently the first to suffer ; and it seems likely that after a transient stage of poplar suckers, elm suckers, and ash, the elm comes to dominate the community, perhaps leading up to the open elm woods or "groves" which are a prominent feature of the vegetation of the plain. This interesting community would repay a closer investigation to throw light on the dynamics of its development. It is to be noted that the two species of ash do not escape the usual pollarding for firewood, so that the normal shape of the crown is not often to be seen. The normal shape of the crown of any tree except the poplar is an unusual sight.

To recapitulate the species prominent in this community :

Tree Layer : *Populus canescens* Sm. Co-dominant with *Fraxinus* spp.

Fraxinus oxycarpa Willd. } Verging towards local
F. Pallisae Wilmott } dominance.

Ulmus nitens Moench.

Quercus pedunculiflora K. Koch.

Shrub Layer : *Smilax excelsa* L. Dominant.

Periploca graeca L. Frequent : many seedlings.

Vitis silvestris Gmel. Frequent.

Cornus sanguinea L. Occasional.

Crataegus monogyna Jacq.

Rubus sp. (probably No. 1109, which is *Rubus rusticanus* Merc.) In more open places.

Rosa sp.

Herb Layer : This is absent in the dense parts, except for occasional tufts of *Carex remota* L. and seedlings of elm, oak, ash, and *Periploca graeca*.

In the more open parts : suckers of poplar and ash, young plants of *Smilax excelsa*, with

Pulicaria vulgaris Gaertn., *Erigeron canadensis* L.,

Eupatorium cannabinum L., *Cirsium creticum* D'Urv.,

Bidens tripartita L., *Carduus leiophyllus* Petr.,

Sonchus arvensis L. var. *Eryngium creticum* Lam.,

laevipes Koch, *Cichorium intybus* L. var.

Hypochaeris radicata L., *glabrata* Presl.,

Centaureum umbellatum Gilib., *Odontites serotina* Lam.,

Berteroa incana DC. var. *stricta* Turrill,

Asperula rivalis S. et S., *Polygonum dumetorum* L.,

Chenopodium polyspermum L. In a marshy place with mud pool, nearly dry in summer, *Cyperus longus* L. is dominant, with *Scirpus lacustris* L., *Glinus lotoides* L., *Camphorosma nesciensis* Turrill, *Mentha longifolia* Huds., and *Lycopus exaltatus* L. fil.

Ground Layer : seedlings as noted above. *Hedera helix* L. is sometimes seen, together with a few mosses and fungi. The copse

described above is surrounded by grassland, the dominant grasses being apparently *Cynodon dactylon* Pers. and *Hordeum maritimum* With., but numerous large tufts of *Juncus maritimus* L. are a characteristic feature, and associated with them are *Phacelurus digitatus* Griseb. and *Agropyron elongatum* P. de Beauv. Usual herbs of the grassland are

Odontites serotina Lam.

Teucrium scordioides Schreb.

Lycopus exaltatus L. fil.

Cichorium intybus L. var.
glabrata Presl.

Verbascum blattaria L.

Eryngium creticum Lam. (this species seems to be extending).

Plantago coronopus L.

Limonium vulgare Mill.

(ii) The western section of these woods is much more open, the oak more frequent in the tree layer, together with *Ulmus* and *Populus canescens*, while the shrub vegetation is richer in species, including *Carpinus orientalis* Mill. (usually found in mountain or hill districts), *Cornus mas* L., *C. sanguinea* L. more rarely, *Ruscus aculeatus* L., and *Crataegus monogyna* Jacq. The climbers are less frequent than in the eastern section, and the tall grass *Erianthus Ravennae* (L.) Pal. de Beauv. penetrates into the clearings and "rides." This grass forms a very distinctive association with tufts of *Juncus maritimus* Lam. just outside the woods, as it also does on the outskirts of the forests fringing the river.

2. In the elm "groves" usually near water, the elm (*U. nitens* Moench) is co-dominant with *Quercus pedunculiflora* K. Koch, and *Fraxinus oxycarpa* and *F. Pallisae* are occasional, as is *Populus canescens* Sm. *Smilax excelsa* L. dominates the shrub layer in many places, and *Ruscus aculeatus* L. is frequent. The community passes into open groves of *Populus* with occasional young trees of *F. Pallisae* in the transition area. The surrounding grassland is very similar to that above described.

3. The open woods of elm and oak (*Q. pedunculiflora* K. Koch) are not so important for the species under consideration. While *F. Pallisae* occurs, it is much more rare than *F. oxycarpa*, both species growing near streams.

In most woodland areas in this region the cutting of trees and pollarding them for fuel, is a strong limiting factor to the development or re-establishment of forest, and the area under forest, even relicts of forest, is steadily diminishing. The increasing rarity of the wild boar is perhaps due to this fact, as well as to closer settlement.

It might be mentioned in conclusion that a closer study of *Fraxinus Pallisae* as occurring in W. Thrace, would show considerable variation in the species as regards the indumentum—possibly the species hybridizes with *F. oxycarpa*.

DISCUSSION.

Two possibilities suggest themselves for consideration: (1) that *F. Pallisae* may be an old species which once had a wide and con-

tinuous distribution but which through geological, palaeometeorological, or other causes has become limited to a few often widely separated areas ; and (2) that *F. Pallisae* is a variety of *F. oxycarpa* from the common stock of which it has mutated independently in several localities or, alternately that it is a polygenetic species. These two possibilities must be considered in some detail.

Western Thrace is basically a part of the ancient land mass which still constitutes so large a portion of the central Balkan Peninsula (see 9, pp. 19 seq.). The southern part from the coast to the foot-hills is covered with weathered débris but how far from the Bosphorus-Dardenelles area the Middle Eocene Transgression spread to the west has not been traced. Shallow areas of water are said (10) to have covered, in Oligocene times, the Thracian basin (of the Maritza and Ergene) and to have spread over part at least of what is now the northern Aegean basin. No marine Miocene is known in the northern Aegean though this has been recognized in the district of Enos (along the north western and north central shores of the Gulf of Xeros). To what extent Pontic and Sarmatic waters (largely brackish and freshwater) covered the North Aegean basin is uncertain. A Sarmatic Gulf of some description probably stretched into the Aegean continent from the east (i.e. from the Black Sea area) but was not continuous with the Mediterranean. The Aegean Sea, i.e. saltwater continuous, from the coasts of Thrace, with the Mediterranean proper, was certainly of relatively very recent origin, probably post-Pliocene (11, 12). The probable age is well discussed by Cvijić who gives a concise summary of the available geological data and says "viele dieser Beobachtungen verlangen jedoch, die Entstehung der nördlicher Ägäis zu Ende des Pliozäns und zu Anfang des Diluviums zu versetzen, obwohl sich dieselben tektonischen Vorgänge auch später fortsetzen" (13). The formation of the Aegean Sea by the faulting and sinking of the Aegean continent, which through so much of the Tertiary period had made the continental parts of the Balkan Peninsula a peninsula of Asia, was caused by great earth movements which involved not only subsidence but also elevation in different, though sometimes neighbouring, parts. How far rivers were changed in the general direction of their drainage during this period we do not know but it is not unlikely that a large part of the Maritza or of the Maritza-Ergene system formerly drained into the Black Sea.

The lowland climate of western Thrace may have been warmer in the middle of the late Tertiary times than it is now and slightly cooler in the Ice Age. The Rodopes were glaciated in an isolated discontinuous manner.

We have now to apply these meagre geological data to the question "Can *Fraxinus Pallisae* be an old relict type in western Thrace?" We have seen that *F. Pallisae* is ecologically limited in its present occurrence to river-deltas and fringing forests in the lower courses of rivers. It has not been recorded from the Maritza basin, but relatively little botanical field work has been done in the area

between Enos and Adrianopol. Its occurrence in this area would strengthen the suggestion that the plant represents an old Pontic type which spread westwards during the formation of the North Aegean Basin, perhaps in connection with changed river-courses. With the data available a direct phylogenetic connection between the *F. Pallisae* in eastern Bulgaria and the *F. Pallisae* in western Thrace cannot be proved and one has to turn to the second possibility that their phylogenetic connection is through a common, more widespread parent and one naturally turns to *F. oxycarpa* Willd.

F. Pallisae is usually or always associated with *F. oxycarpa* (1, 2, 3, 4, 5, 6, and Tedd above). In the non-leafy condition the two are indistinguishable apart from the indumentum of the young shoots when viewed under a lens (Tedd). *F. Pallisae* is quite distinct from *F. holotricha* Koehne and from *F. coriariaefolia* Scheele. As this matter has been fully discussed by Wilmott (1) and Mattfeld (2) it need not be further mentioned here, except to express a regret that quite a number of recent authors seem to ignore the facts set out by Wilmott and Mattfeld.

F. oxycarpa is a decidedly polymorphic species. Lingelsheim (14) describes eight varieties and a number of forms. Of these, var. *oxyphylla* (Marsch. Bieb.) Lingelsh. f. *Bornmülleri* Lingelsh., from Corfu, has "foliola subtus basin versus crispulo-griseo-villosa," and var. *tamariscifolia* (Vahl) Lingelsh. has "foliolorum rhachis pilosa." The remainder, so far as is stated in the descriptions have glabrous mature leaves.

An examination of the material of *F. oxycarpa* in the collections at Kew shows that plants occur with mature leaves quite glabrous but that other specimens have a varying amount of indumentum on the lower surface in quite mature leaves. This is usually present as a compact narrow belt on both sides of the midrib in the lower quarter or third of the leaflet. The belt is sometimes rather wider on one side than on the other and may extend higher up the leaf on one side (in lateral leaflets on the side towards the leaf apex). More rarely the hairs spread (in the lower part of the leaf on the under surface only) nearly or quite to the margins. Most, if not all of the hairs are simple, but they sometimes arise in small tufts and thus and by their overlapping sometimes give a false appearance of branching. As seen under the low power of the compound microscope they are very similar to the hairs on the leaflets of *F. Pallisae*. Hairs have, however, not been observed on the upper surface of the leaflets, on the leaf rhachis of mature leaves, or on the young stems.

In the shape of the leaflets *F. oxycarpa* and *F. Pallisae* show a very similar range. Narrower and broader, longer and shorter, more or less coarsely toothed, more or less acuminate leaves occur in *F. oxycarpa* as the species is now usually (and probably correctly) accepted and similar variations appear in the material of *F. Pallisae* described by Wilmott and in that collected by Tedd.

The fruit variations, so far as they are known, are again parallel in *F. oxycarpa* and *F. Pallisae*. Contorted fruits (as in *F. Pallisae* var. *gyrocarpus* Wilmott) may be found on plants of *F. oxycarpa* though whether they indicate a real genetical variety is quite uncertain. The fruit apex ranges in both (as it also does in *F. excelsior*) from acutely acuminate to obtuse, rounded, or even retuse. The characters of the fruit apex are probably, in part, dependent on a number of genes. At least, a given shape is frequently relatively constant for an individual plant.

Wilmott did not have flowering material when he described *F. Pallisae*. Mattfeld (2) described flowers from a specimen collected by Sintenis in the Dobruja. One hermaphrodite flower from this material is figured (2, p. 281, fig. 6). The following is a translation of Mattfeld's description: "The inflorescence is many flowered, the branches are at first thickly hairy, but later become more or less glabrous. The flowers are on long (1 cm. and more) and thin pedicels, they are hermaphrodite; the young ovary is (without the style) about 2 mm. long, in the lower half covered thickly with long white hairs and moreover at the base especially thickly covered with scale-hairs; it ends with a thin style 2-2.5 mm. long (excluding the stigmatic arms), the style is split into two linear or nearly linear—lanceolate 1-1.5 mm. long arms. At its base are two stalked stamens; the filaments are about 1 mm. long, and thus reach to half the length of the ovary or even somewhat more; the anthers contain normally formed pollen."

A study of the excellent series of flowering specimens collected by Tedd makes some comments on this description desirable. In the Thracian plants the inflorescence branches are glabrous or only slightly hairy; the pedicels are rarely up to 1 cm. long, the average length being 0.5 cm. or less. The flowers may be hermaphrodite (as most of the flowers in *Tedd* 1324), or male (as most of the flowers in *Tedd* 1320, 1322), or showing various stages in the abortion of the gynoeceum (as in *Tedd* 1321 and 1323). The young ovary shows a varying development of hairs but is rarely so evenly hairy with fine spreading hairs as shown in Mattfeld's figure. "Scale-hairs" are present (they are not shown in Mattfeld's figure). The most important point however, is the shape of the stigmatic (or stylar) arms. Mattfeld describes them as "lineal oder fast lineal-lanzettliche," and figures them as narrow, somewhat narrowed upwards separated right from the base, at first divergent and then conniving at their apices. In the Thracian specimens the stigmatic arms are parallel and pressed together by their inner surfaces except for a slight divergence at the apex. Usually they are quite short but do attain to about 1.5 mm. in length in hermaphrodite flowers of *Tedd* 1323 where they are of the same narrow shape as in the flower figured by Mattfeld, but are not diverging. There is a very considerable range in stigma shape in the remaining specimens, in addition to differences due to age.

Thus, apart from the degree of development and distribution of the indumentum, no constant differences which can be really regarded as specific can be found between *F. oxycarpa* and *F. Pallisae*. The evidence would seem to indicate that, whether regarded as a variety of *F. oxycarpa* or as a species closely related to it, *F. Pallisae* may well have originated independently in river deltas of the Pontic and Aegean from *F. oxycarpa*.

It is very desirable that more research on the variation of *F. oxycarpa* should be undertaken in the Balkan Peninsula. Series of specimens from all the districts would be welcomed at Kew as would also ripe fruits with viable seeds for raising living material. A study of the nature and distribution of variations of common and widely spread species may yield more valuable scientific data than the stimulation felt on discovering a new endemic or some other rarity.

Literature.

- (1) Wilmott A. J. in Journ. Linn. Soc. Bot. **43**, 283 (1916).
- (2) Mattfeld J. In den Auwäldern der Kančija in Bulgarien und über einige südöstliche Eschen in Mitt. Deutsch. dendrolog. Ges. Nr. **35**, 277, fig. 2, 3, 5 (1925).
- (3) Stojanoff N. Der Longos-Wald in Bulgarien, in Engler's Bot. Jahrb. **62**, 502 (1929).
- (4) Turrill, W. B. Review of (3) in Journ. Ecol. **18**, 177 (1930).
- (5) Mattfeld J. Die Pflanzengeographische Stellung Ost-Thrakiens in Verh. Bot. Ver. Prov. Brandenburg **61**, 1 (1929).
- (6) Stefanoff B. The forest formations in the northern part of the Strandja mountains (Bulgarian with Germany summary), in God. na Sof. Univ. **20**, ii. 23 (1924).
- (7) Turrill W. B. The occurrence of *Fraxinus Pallisae* in Western Thrace in Kew Bull. 1934., 44.
- (8) Tedd H. G. and Turrill W. B., The elms of Western Thrace in Kew Bull. 1933, 232.
- (9) Turrill W. B. The Plant-Life of the Balkan Peninsula, Oxford, 1929.
- (10) Schaffer, Landeskunde von Thrakien, Sarajevo, 1918; especially pp. 47 seq.
- (11) Arldt. T., Die Entwicklung der Kontinente und ihre Lebenswelt, Leipzig 1907; especially pp. 428 seq.
- (12) Suess E., La Face de la Terre, Paris, 1897-1911.
- (13) Cvijić J. Grundlinien der Geographie und Geologie von Mazedonien und Altserbien, in Peterm. Mitt. Ergänz. 162 (1908).
- (14) Lingelsheim A. Oleaceae—Oleoideae—Fraxineae in Engler Pflanzenreich, **4**, 243 I.u.II. 53 (1920).

Camphorosma nestensis Turrill.

A *C. monspeliaca* L. foliis floribusque valde hirsutis, inflorescentiis laxioribus, floribus gynomonoeciis, perianthii lobis lateralibus leviter extrorsus curvatis, stylo (ramis exclusis) brevior, differt.

Planta inferne suffruticosa, caulibus teretibus paulum ramosis saepe purpureis plus minusve prostratis vel ascendentibus. *Folia* subulato-linearia, obtusa, 3-4.5 mm. longa, 0.3-0.5 mm. lata, hirsuta, in pagina superiore complanato-sulcata. *Inflorescentia* laxa, ramis lateralibus brevibus densioribus interdum praedita. *Flores* sessiles, in foliorum axillis solitarii. *Perianthium* longe hirsutum in floribus femineis 1.5-2.5 mm. longum, lobis lateralibus foliis subsimilibus complanatis leviter extrorsus curvatis 0.75-1.5 mm. longis (supra tubum), lobo adaxiale et lobo abaxiale vix 0.5 mm. longis (supra tubum) 0.5-0.75 mm. latis latissime membranaceo-marginatis, in floribus hermaphroditicis 4 mm. longis, lobis lateralibus 2.5 mm. longis leviter extrorsus curvatis, lobo adaxiale et lobo abaxiale 1.5 mm. longis erectis. *Stamina* (in floribus hermaphroditicis) 4; antherae 1.3-1.75 mm. longae; filamenta 2.25 mm. longa. *Ovarium* compressum, ambitu ellipticum vel obovato-ellipticum, circiter 0.6 mm. altum et 0.5 mm. latum; stylus 0.5 mm. longus (ramis exclusis), ramis 3.5 mm. longis.

W. THRACE: Bekki Ovasi in flat sandy "pans" in grassland near woods, 20.9.1933. *Tedd* 1242.

The genus *Camphorosma* contains about ten known species. The main distribution area is from southern Russia to Central Asia with the north eastern part of the Orient in Boissier's sense. This area is, of course, exceptionally rich in members of the *Chenopodiaceae*. The most widespread species of the genus is *Camphorosma monspeliaca* L. which ranges through most parts of the Mediterranean Region to Central Asia. As one so often finds with the most widely spread species of a taxonomic group, it is also the most polymorphic but does not appear to have received an intensive study from modern botanists. Litwinow (in Trav. Mus. Bot. Acad. Imp. Sci. St. Pétersb. 2, 86; 1905) deals with the Russian variations of the species and describes two varieties; var. *pilosum* calyce ex toto breviter piloso v. basi glabrescente, and var. *hirsutissimum* calyce ex toto longius rufo-(v. rarius albo-) hirsuto, interdum basi glabrescenti. The latter variety shows some morphological resemblances to *C. nestensis* but the characters noted in the differential diagnosis, apart from the indumentum, serve to distinguish the species. *C. monspeliaca* L. has been recorded from western Thrace but no specimens from this area have been seen by the writer.

C. ovata W. et K. and *C. annua* Pall, have a superficial resemblance to *C. nestensis* but differ, *inter alia*, in having definitely annual slender descending roots.

C. nestensis is named from the old name Nestus, of the River Mesta (Karasu). The gynomonoecious condition is interesting, the female flowers being much smaller than the hermaphrodite. In

some plants (or parts of plants) the former are present almost alone, in other plants hermaphrodite flowers predominate, with the relative number of female flowers increasing towards the ends of the partial inflorescences.

XII—THE FLORA OF MADRAS : VIII.*

With the publication of part 10 (pp. 1689-1864), devoted entirely to the *Gramineae*, the flora is practically complete. The final part will contain the addenda, errata, indices, etc. Mr. Fischer has made the following notes in continuation of those which have appeared in these pages on the issue of previous parts.

NOTES ON THE FLORA OF MADRAS : PART X.

C. E. C. FISCHER.

POGONATHERUM.

Page 1714. *P. crinitum* Trin. In Fl. Br. Ind. 7, 141, the distribution is given as "throughout India." There has been considerable confusion between this species and *P. paniceum* Hack. (= *P. saccharoideum* Beauv.). In my opinion all the specimens of the genus from S. India belong to this latter species.

THELEPOGON.

T. elegans Roth. Malabar is cited in Fl. Br. Ind. 7, 148 as part of its habitat, but this is taken from Stock's labels reading "Konkan and Malabar," and his plants were collected in the Bombay Presidency. Having seen no specimens from the Madras area I have excluded the genus.

PSEUDOPOGONATHERUM.

Page 1716. *P. contortum* A. Camus (= *Pollinia articulata* Trin.) Fl. Br. Ind. 7, 110 cites "Nilgiri Hills; the Wynaad, Heyne" among the localities, but the sheet giving this information is *Eulalia tristachya* O. Ktz. (= *Pollinia argentea* Trin.).

MICROSTEGIUM.

Page 1716. *M. ciliatum* A. Camus (= *Pollinia ciliata* Trin.) Fl. Br. Ind. 7, 116 quotes "Nilgiri Hills, Wight" as one of the habitats. The only sheet of this species in the Kew Herbarium of Wight's collection gives no locality. It may, therefore, just as well have been obtained in the Pulney Hills from which mountains and from Travancore other specimens of the species have been derived.

ISCHAEMUM.

Page 1717. A difficult genus the species of which have been much confused in herbaria. The statements found in Floras regarding the sex of the florets are often untrustworthy, as the character is variable, and also the stamens tend to disappear at an early stage leaving no trace. In the same species the glumes may be quite smooth at first, later becoming noduled and ridged as they harden. The genus as dealt with in the Fl. Br. Ind. has been split into three, the other two being *Pollinidium* Stapf ex Haines and *Sehima* Forssk.

* Continued from K.B. 1931, 266

Page 1721. *I. aristatum* Linn. is described in Fl. Br. Ind. 7, 126 and by Hackel in Monogr. Androg. 202 as having nodulose margins to the lower glume of the sessile spikelets. It is so figured by Rang Achariya and Tadulingam in Some South Indian Grasses, fig. 130. The sheet of this species in the Linnean Herbarium has the lower glumes quite smooth. The figure quoted above is certainly a new species which I have called *I. Rangacharianum* (K. B. 1933, 352). The two sheets quoted by Cooke in Fl. Bomb. Pres. are also probably new species.

I. ciliare Retz. is identical with *I. aristatum* Linn. as established by Stapf in MS. in Kew Herbarium.

Page 1722. *I. hirtum* Hack. I have seen no specimens of this species from the Madras region; those quoted in Fl. Br. Ind. 7, 135 from the Nilgiri Hills are *I. nilagiricum* Hack.

I. molle Hook. f. In the Fl. Br. Ind. 7, 128 no mention is made of any rugosity on the lower glume of the sessile spikelets, but the Central Provinces sheet quoted has definite shallow transverse rugosities across the glumes. In Dalziel's sheet, though most of the glumes are smooth, here and there some have slight nodules on the margins, but they are much concealed by the indumentum.

CAPILLIPEDIUM.

Page 1730. *C. Huegelii* Stapf. After examining an extensive series of *Andropogon Schmidii* Hook. f., I have found it impossible to separate it from *A. Huegelii* Hack. It is a variable species; the leaves are as often smooth as scabrid, the glumes may be villous, scaberulous or glabrous on the back, sometimes all three on the same plant.

AMPHILOPHIS.

Page 1732. *Andropogon montanus* Roxb. Fl. Br. Ind. 7, 176, is represented apparently only by a drawing in the Roxburgh Collection of drawings in the Kew Herbarium. I agree with Haines, who, in Bot. Bih. & Or. 1028, states that it is probably identical with *A. intermedius* R. Br. = *Amphilophis glabra* Stapf.

MANISURIS.

Page 1759. This genus was made for and first used in the combination *M. Myurus* Linn. Mant. 2, 164 and 300 (1771), and must be retained in conjunction with that species, which has been incorrectly relegated to *Rottboellia* by Bentham. It should include also the section *Peltophorus* Hack. of *Rottboellia*. For *Manisuris* as applied to the species *M. granularis* Linn. f. in Fl. Br. Ind. 7, 159, O. Kuntze's name *Hackelochloa* must be adopted.

OPLISMENUS.

Page 1778. *O. undulatifolius* Beauv. Fl. Br. Ind. 7, 66. In his completion of Trimen's Handb. Fl. Ceyl. 5, 169, Hooker expresses the opinion that this species is a form of *O. compositus* Beauv. with a simple terminal spike of sessile spikelets. In several specimens of the latter species from S. India short lateral racemes occur here and there. I have, therefore, sunk the first-named species under the latter.

HOLCOLEMMMA.

Page 1779. Fl. Br. Ind. 7, 43 gives "Southern Deccan Peninsula, Wight" as well as Ceylon as the habitat of *Panicum canaliculatum* Nees. All the specimens of this species in the Kew Herbarium show definite evidence of collection in Ceylon except three sheets of Wight's herbarium which bear merely the printed label "Peninsula Ind. orientalis," which in that collection covered Ceylon as well. It is possible, therefore, that the species does not occur in S. India, but in view of the doubt, I have included it under *Holcolemma canaliculatum* Stapf et Hubbard.

PANICUM.

Page 1783. *P. Gardneri* Thw. was included in Fl. Br. Ind. 7, 26 under *Isachne*, but the two lemmas being dissimilar Thwaites correctly transferred the species to *Panicum* in Enum. Pl. Zeyl. 359.

PENNISETUM.

Page 1792. *P. Alopecuroides* Steud. Fl. Br. Ind. 7, 84, is an invalid combination as it was preceded by *P. alopecuroides* Jacq. *Panicum hordeiforme* Thunb., quoted as a synonym, is a different plant. The earliest valid name for the species appears to be *Pennisetum Hohenackeri* Hochst. ex Steud., founded on Hohenacker's sheet No. 930 collected in the Nilgiri Hills.

ISACHNE.

Page 1797. *I. australis* R. Br.; Fl. Br. Ind. 7, 24. It is doubtful that this species occurs in India. The specimens from S. India so named in the Kew Herbarium, including those determined by Hooker, do not agree with typical specimens from Australia, and are, in my view, to be referred to *I. dispar* Trin., *I. elegans* Dalz. and *I. miliacea* Roth. In the typical *I. australis* the two lemmas are very similar in size and structure and are quite glabrous.

ARUNDINELLA.

Page 1801. *A. nervosa* Nees and *A. setosa* Trin. Fl. Br. Ind. vii. 70. Having examined a considerable number of specimens of these two, I find myself unable to distinguish them by any constant character. There is a complete series from quite glabrous to very setose glumes. There are similar intermediates in other features and others again are variable. I have, therefore, united them under the earlier binomial *A. setosa*.

A. braziliensis Raddi. It is probable that more than one species are comprised under this name in Fl. Br. Ind. 7, 73 and that none is identical with Raddi's plant. For the S. India species I have adopted the name *A. nepalensis* Trin. which was cited as a synonym in the above-mentioned work.

SETARIA.

S. viridis Beauv. In Fl. Br. Ind. 7, 81, "Nilgiri Hills? (perhaps introduced) Heyne (in Herb. Wallich. n. 8640D)" is included in the distribution of this species. There is nothing on the sheet quoted to indicate either the collector or the locality of collection. On the combined label for the whole set of sheets under no. 8640,

however, is inscribed “?D. Hb. Heyneon.” In the Wall. Cat. Heyne is usually indicated by “Hb. Heyn.” The only other sheet in the Kew Herbarium of this species that might be attributed to S. India is part of a sheet of Herb. Rottler, which gives no locality whatever and I have seen no other specimens that might be considered to come from S. India. It is known that the members of the Society of “United Brothers,” in which both Heyne and Rottler were included, exchanged specimens from various parts of India. I consider, therefore, that the two sheets quoted were collected from elsewhere and have excluded the species.

AGROSTIS.

Page 1810. *Calamagrostis pilosula* Hook.f. and *C. Smidii* Hook.f. Fl. Br. Ind. 7, 263 and 264 respectively. In these two species the beard of the callus is longer than is usual in *Agrostis*, but is still less than half as long as the lemma. I consider that they cannot be separated from the species of that genus by any satisfactory character and I have brought them under it.

GARNOTIA.

Page 1812. *G. tenuiglumis* Stapf ex Hook.f. in Fl. Br. Ind. 7, 242 is based on a single sheet: *Wight* 3247, which lacks the basal part of the plant. It is shown to differ from *G. scoparia* Stapf ex Hook.f. by very slight and rather vague characters, the clearest being that the nerves of the upper glumes are said to be solitary in the former and three in the latter. Dissection of the specimen referred to, however, shows three nerves in the upper glumes, though sometimes the lateral nerves are obscure. The other differences are variable and vanish when a full set of specimens is examined. I have, therefore, united the two under *G. scoparia*.

TRAGUS.

Page 1813. *T. racemosus* All. Mr. Hubbard has drawn my attention to the fact that the Indian plant referred to under this name in Fl. Br. Ind. 7, 97 and in Indian Floras generally, is not identical with the European species, though superficially very like it. I have verified that they differ as follows: In the Indian plant the lower glume is slightly shorter, broader, deeper and more acutely acuminate, 5-ribbed and thin and semi-transparent between the ribs; the spikelets are invariably binate and face one another so as to appear as if the two spikelets are the two glumes of a single gaping spikelet. In *T. racemosus* the spikelets are 3-6 on short lateral branchlets, the lower glumes are usually 7-ribbed and opaque and thick between the ribs. Hackel considered the Indian plant to be a var. *biflorus*, but it seems to be more practical and satisfactory to restore it to specific rank under its earliest independent name: *T. biflorus* (Roxb.) Schult in Mant. ii, 205 founded on *Lappago biflora* Roxb. Fl. Ind. 1, 2284.

LOPHOLEPIS.

Page 1813. Both in Fl. Br. Ind. 7, 98 and Handb. Fl. Ceyl. i, 188, the number of stamens is given as two. In a number of

dissections, whenever the stamens could be clearly distinguished, I have counted three.

POLYTOCA.

P. punctata Stapf ex Hook.f. in Fl. Br. Ind. 7, 102 "Deccan Peninsula, Rottler" is cited as the habitat in India. On Rottler's sheet, however, there is no evidence of provenance. It is known that Rottler received specimens from other collectors and from other lands. As the grass is known from Java and elsewhere outside India and I have seen no sheets from any part of India, I have excluded the species.

SPOROBOLUS.

Page 1817. *S. commutatus* Kunth. Ranga Achariya and Tadalingam in S. S. Ind. Grasses, 230, have treated this as a good species separable from *S. coromandelianus* Kunth because the pedicels and spikelets droop and are not appressed. I find that in the type of *S. coromandelianus* and in a sheet determined as such by Ranga Achariya, that some of the spikelets are appressed and others are patent. I do not think that the difference is constant or specific and I follow Fl. Br. Ind. 7, 253 in uniting them.

ERAGROSTIS.

Page 1826. *E. interrupta* Beauv. is based on *Poa interrupta* R. Br., an Australian grass not found in India. *P. interrupta* Lam. is an Indian grass, but the combination for this species under *Eragrostis* is invalid being preoccupied. The next oldest name for the species appears to be *Poa japonica* Thunb. By the kindness of the Director of the Upsala Museum, I have been able to examine Thunberg's type and find it identical with *Eragrostis interrupta* Hook.f. non Beauv. var. *tenuissima* Stapf in Fl. Br. Ind. 7, 316. It is more practical to separate this variety from the other two described in the Fl. Br. Ind., viz. *Koenigii* and *diarrhena* and it becomes *E. japonica* (Thunb.) Trin. The second of the two other varieties I have restored as an independent species as *E. diarrhena* (Schult.) Steud., with the other as variety *Koenigii*.

Page 1828. *E. coromandeliana* Trin.: Fl. Br. Ind. 7, 326. After carefully examining a large number of specimens of this and of *E. bifaria* Wight, I am unable to separate them. Roth in Nov. Pl. Sp. 71 in Obs. I stated that he could only distinguish them on Vahl's description (in Symb. Bot. 2, 19) of the rhachis of *Poa bifaria* as: "rhachis altero latere planus, altero convexus." This, however, is probably a slip, for in all the specimens, whether determined as *coromandeliana* or *bifaria*, the rhachis is linearly alveolate to house the glume. The difference noted in Fl. Br. Ind. regarding the distinct wings of the paleas does not hold good since the width of the wings varies very much in the same spike and are often distinct in specimens determined as *E. coromandeliana* on other grounds. Willdenow also was persuaded of the identity of the two as shown by the footnote in Ges. Naturf. Fr. Berl. Neue Schrift. 4, 191, where *Poa coromandeliana* was first described. *Poa bifaria*

Vahl being the earlier name it must be adopted for the combination *Eragrostis bifaria* (Vahl) Wight ex Steud.

MELANOCENCHRIS.

Page 1831. *Gracilea nutans* Koen. ; Fl. Br. Ind. 7, 283. This combination was first published by Rottler in Ges. Naturf. Fr. Berl. Neue Schrift 4, 218 (1803) in synonymy under *Pommereulla monoica*. No validity, therefore, can be claimed for either the generic or the specific epithet. The correct name when segregated from *Pommereulla* is *Melanocenchris*, instituted by Nees in Proc. Linn. Soc. 1, 95 (1841). Nees, however, did not use the combination which is correct under the present international rules. In Rev. Gen. 780 (1891) O. Kuntze has stated the correct combination but has based it on Roth's name in Nov. Sp. 33 (1821), where Roth described a plant received from Heyne, who may have had the name from Rottler and attached it erroneously to his specimen. Roth described the leaves of his plant as "complicata, canaliculata, apice convoluta," a description which agrees well with *M. Royleana* Nees, but not with *Pommereulla monoica* Rottl. of which the leaves are stated to be "plana." Roth's name, therefore, is invalid, and in consequence, also O. Kuntze's combination under *Melanocenchris*. Rottler's name was validly published and the correct combination becomes *Melanocenchris monoica* (Rottler) C. E. C. Fischer.

CYNODON.

Page 1835-6. *C. intermedius* Rang. et Tad. and *C. Barberi* Rang. et Tad. I have examined a number of specimens of these two plants and of *C. Dactylon* Pers. Of the characters given for the first two by the authors I have found only one to be constant and that is that in *C. Barberi* the lemma is never longer than the upper glume. The hairs in this species I have found to be minutely knobbed under the lens and not truly clavate, nor are they invariably present. I have not found such hairs in *C. intermedius*. The leaves of all three plants vary considerably and I cannot base any distinction on those organs. For these reasons I have considered it advisable to reduce *C. intermedius* to a variety of *C. Dactylon*.

TEINOSTACHYUM.

Page 1860. *T. Wightii* Bedd. For. Man. cexxxlii ; Fl. Br. Ind. 7, 410. This combination was based on *Bambusa Wightii* Munro, Trans. Linn. Soc. 26, 111, which was described from vegetative parts only. In Ann. Roy. Bot. Gard. Calc. 7, 127, Gamble has shown that this plant, collected by Wight, is an *Ochlandra* and not identical with Beddome's which is a *Teinostachyum*. Under the international rules the trivial *Wightii* must be retained under *Ochlandra* and is not available for Beddome's plant, and as no other specific epithet appears to have been applied to it another must be provided. I have proposed to call it *Teinostachyum Beddomei*.

OCHLANDRA.

Page 1863. *O. Rheederi* Benth. ex Gamble ; Fl. Br. Ind. 7, 418. The earliest name given to this species is *Bambusa scriptoria* Dennst.

in Schleuss Herb. Malab. 31 (1818). It precedes the first use of the trivial *Rheedei* in the combination *Beesha Rheedii* in Kunth Rev. Gram. 1, 141 (1829) and must therefore be adopted as *Ochlandra scriptoria* (Dennst.) C. E. C. Fischer.

Page 1864. *O. Brandisii* Gamble : Fl. Br. Ind. 7, 420. This is the species first described as *Bambusa Wightii* Munro as stated above and the epithet *Wightii* must be retained in the combination *Ochlandra Wightii* (Munro) C. E. C. Fischer.

Since the issue of part 9 the following case has arisen and I take the opportunity of making the correction.

FIMBRISTYLIS.

1658. *F. dichtoma* (Linn.) Vahl and *F. annua* R. et S. var. *diphylla* (Retz.) Kuek. Mr. J. E. Dandy has shown me that the second of these combinations is incorrect and must be replaced by the first, which hitherto has been consistently applied to the wrong species. He has been good enough to let me have his notes and on them the following remarks are mainly based :—

F. dichtoma Vahl Enum. Pl. 2, 287 (1806) is founded on *Scirpus dichotomus* Linn. Sp. Pl. 50 (1753). Linnaeus gave this binomial to a plant listed in his own Fl. Zeyl. 16, no. 40 (1747) as “*Scirpus culmo triquetro nudo . . .*” which was based on “*Gramen parvum, . . .*” Herm. Zeyl. 26 and “*Gramen Cyperoides Maderaspatanum Juncelli Gesneris . . .*” Pluk. alm. 179, t. 119, f.3. Fortunately the type specimens of both these latter authors are preserved at the Brit. Mus. Nat. Hist. They are identical and are also identical with *Scirpus diphyllus* Retz. Obs. 5, 15 (1789). This latter has been placed by Kueckenthal under *Fimbristylis annua* (All.) Roem. et Sch., Syst. 2, 95 (1817), based on *Scirpus annuus* All. Fl. Pedemont, 2, 277 (1885), as var. *diphylla* vide Fl. Pr. Madras, 1658 (1931). It follows that *Scirpus dichotomus* Linn. being identical with *S. diphyllus* Retz. the so-called *Fimbristylis dichtoma* must receive another name. The earliest independent name applied to this second plant appears to be *Scirpus bis-umbellatus* Forssk. Fl. Aegypt.-Arab. 15 (1775).

These facts have already been observed by P. Bubani, who made the combination *Fimbristylis bis-umbellata* in his Dodecanthia, 30 (1850) without, however, stating the origin of the specific epithet. Though he makes no reference to Forsskaal's book, it is evident that he adopted the trivial epithet from that work since he quotes Webb et Berthel. Phyt. Canar. 3, sect. ult. 368 (1840) in which *S. bis-umbellatus* Forssk. occurs as the second binary synonym cited under *F. dichtoma* Vahl, *S. dichotomus* being the first.

The synonymy of the two species is as follows :—

Fimbristylis bis-umbellata (Forssk.) Bubani, Dodecanth. 30 (1850). *Scirpus bis-umbellatus* Forssk. Fl. Aegypt-Arab. 15 (1775). *Scirpus niloticus* J. F. Gmel. in Linn. Syst. Nat. ed. 13, 2, 126 (1791). *Fimbristylis dichtoma* (Linn.) Vahl Enum. Pl. 2, 287 (1806) pro parte ; C. B. Clarke in Dur. et Sch. Consp. Fl. Afr. 5, 602 (1894) and in Dyer Fl. Trop. Afr. 8, 414 (1902). *Fimbristylis dichtoma*

Vahl var. *villosa* Vahl, l.c. (1806). *Fimbristylis annua* (All.) Roem. et Sch. var. *diphylla* (Retz.) Kuek. ex C. E. C. Fischer Fl. Pr. Madras, 1658 (1931).

Fimbristylis dichotoma (Linn.) Vahl Enum. Pl. 2, 287 (1806), excluding var. *villosa*. *Scirpus dichotomus* Linn. Sp. Pl. 50 (1753). *Scirpus annuus* All. Fl. Pedemont. 2, 277 et 3, t.88, fig. 5 (1785). *Scirpus diphylus* Retz. Obs. 5, 15 (1789).

In making a new variety *villosa* under *Fimbristylis dichotoma* Vahl in Fl. Pr. Madras, 1658, I overlooked the existence of Vahl's variety of the same name quoted above. A new name has to be applied, therefore, and I propose to call it **F. bis-umbellata** Bub. var. *hirtistyla* C. E. C. Fisch.

XIII.—STUDIES IN THE ERICALES: * II.—A NEW GENUS OF VACCINIOIDEAE FROM BORNEO. H. K. AIRY-SHAW.

Among the many interesting novelties obtained by the Oxford University Expedition to Sarawak in 1932 is a remarkable epiphyte with something of the habit of certain South American species of *Macleania*, such as *M. rotundifolia* Sod. et Hoer. and *M. amplexicaulis* A. C. Smith. Its closest affinity, however, lies elsewhere, as will be seen from the descriptions and discussion below. The plant was collected on three occasions, fortunately representing all stages from bud to ripe fruit.

Cymothoë *Airy-Shaw* [Ericaceae—Thibaudieae], gen. nov., ab *Iaera* H. F. Copel. petiolis glandula utrinque destitutis, floribus tetrameris, seminibus numerosis (circiter 15 in quoque loculo), a *Costera* J. J. Smith his characteribus et insuper calycis dentibus haud glanduloso-apiculatis, corolla alte (saltem duas partes) sympetala, staminibus corollae lobis numero duplis (8), antheris haud clavato-papillosis bene distincta. (Κυμοθήη, quaedam Nereis).

Calycis tubus cum pedicello continuus, oblongo-campanulatus; limbus breviter cupularis, brevissime 4-dentatus. *Corolla* infundibulari-campanulata, usque ad tertiam partem 4-loba, lobis aestivatione imbricatis sub anthesi erectis. *Stamina* 8, inclusa: filamenta distincta, ima basi corollae adhaerentia, brevia, aequilonga, longe ciliata; antherae dorso ecalcaratae, papillosae, in tubulos liberos thecis subduplo longiores poro apicali oblongo introrsum dehiscentes productae. *Discus* parvus, integer. *Ovarium* 4-loculare; ovula in loculis numerosa; placentatio difficillime observata, sed ut videtur axilis; stylus gracilis, stigmatate truncato. *Fructus* breviter ovoideus, subexsuccus, obsolete 4-locularis, polyspermus. *Semina* subcuneiformia, obtuse angulata, testa firma crebre elevato-reticulata pallide brunnescente mucilaginoso.

Frutex parvus, laxus, glaber, epiphyticus. Folia alterna, breviter petiolata, ovata usque saepius orbicularia et basi auriculata,

* Continued from *K.B.* 1935, p. 53.

integerrima, persistentia, palmatim nervosa, nervis manifestis. Flores parvi, axillares vel extra-axillares, solitarii vel gemini, epedunculati, longe et gracillime pedicellati, alabastro nutantes corolla conico-oblonga, sub anthesi erecti, rosei.

Cymothoë cyclophylla *Airy-Shaw*, sp. nov. (adhuc unica).

Frutex parvus, saepe epiphyticus, laxe subscandens, 2-3 m. alta. *Ramuli* rigidi, parce et irregulariter ramosi, optime teretes, usque 4 mm. diametro, cortice vetustiore cinereo iuniore castaneo. *Folia* suborbicularia, multo rarius latissime ovatis vel elliptico-ovatis, 5-12 cm. diametro (rarius 5.5-6.5 cm. longis et 4-6 cm. latis), basi rotundata usque cordata et saepe auriculato-imbricata velut amplexicaulia, auriculis magnis rotundatis, apice optime rotundata vel levissime retuso-truncata, margine plano integerrimo, rigide coriacea, glaberrima, paginis inter se simillimis sed plerumque superiore nitidula inferiore obscura; costa et nervi utrinque elevati; nervi primarii utroque latere costae 3-4, ab ima basi eius palmatim orti, quam costa vix tenuiores, marginem versus late arcuati atque varie sed regulariter anastomosantes; nervi secundarii a costa superne pinnatim orti, etiam a nervis primariis latere exteriori orti, cum proximo nervo primario anastomosantes; venuli ultimi manifeste et crebre reticulati; petioli brevissimi, subnulli usque 7 mm. longi, robusti, basi articulati, glandulis lateralibus ut videtur nullis vel saltem obscurissimis. *Flores* valde irregulariter editi, axillares vel saepe manifeste extra-axillares, interdum ut videtur e ramis specialibus aphyllis gracilioribus orti, fasciculati, fasciculis 1-2-floris basi perulis nonnullis minutis fuscis suffultis; pedicelli gracillimi, 1-2.7 cm. longi, paullo supra basin bracteolis binis ovato-oblongis acutis vix 1 mm. longis plus minus adpressis instructi, apice sensim incrassati, in ovarium sine articulo transeuntes, glaberrimi, alabastro apice cernui, sub anthesi stricti. *Ovarium* 4-loculare, sub anthesi breviter oblongum, 1-1.5 mm. longum et latum, tetragonum, angulis lobis calycinis alternantibus, glabrum, nitidulum. *Calyx* late cupularis, 1-2 mm. longus, brevissime et latissime 4-lobus, subcoriaceus, glaber, nitidulus, lobis latissime triangularibus subcuspidatis acutiusculis basi 1.5-2 mm. latis. *Corolla* alabastro conico-oblonga, sub anthesi infundibulari-campanulata, 6-7 mm. longa, rosea, glabra: tubus circiter 4 mm. longus; lobi deltoideo-ovati, 2-3 mm. longi et basi subaequilati. *Stamina* 8, inclusa, aequalia, tota circiter 5 mm. longa: filamenta brevissima, applanata, circiter 2 mm. longa, ima basi corollae adnata, marginibus praecipue superne longe ciliata, ciliis adscendentibus; antherae lineari-lanceolatae, 3-4 mm. longae, paullo supra basin dorsifixae, basi obtusae, papillosae, dorso ecalcaratae, in rostra omnino libera teretia obtusiuscula poro apicali oblongo introrso dehiscentia sensim angustatae. *Discus* inconspicuus, annularis, integer. *Stylus* modice gracilis, 5-6 mm. longus, teres, glaber, stigmatate truncato. *Fructus* maturus breviter ovoideus, 4-5 mm. diametro, calyce persistente erecto vel incurvo coronatus, ut videtur durus, sub-

exsuccus. *Semina* obtuse angulata, 1-1.5 mm. longa, 0.5-1 mm. lata, testa pallide castanea pulcherrime foveolato-reticulata.

SARAWAK. In moss forest, Dulit Ridge, 1230 m., 12 Sept. 1932, *Richards* 1740: "Small woody scrambler, c. 3 m. long. Flowers mauvish pink. Leaves thick and leathery." In white sand-forest, Ulu Koyan, 900 m., 15 Sept. 1932, *Richards* 1829: "Straggling shrub. Corolla pink, conical." Open moss-forest on exposed peak, Dulit Ridge (commoner in shady moss-forest), 1400 m., 17 Sept. 1932, *Richards* 1890 (typus, Herb. Kew.): "Straggling woody climber, often epiphytic, c. 2 m. high. Corolla pink."

The affinities of the group of genera to which *Cymothoë* belongs have hitherto remained obscure. The genus *Costera*, with one species, *C. ovalifolia*, was described by Dr. J. J. Smith (in Ic. Bogor. 13, 77, t. cccxiv: 1910) with only vague suggestions as to its nearest allies: it was pointed out that the fasciculate inflorescence resembled that of *Diplycosia*; the non-articulate pedicel, that of *Pentapterygium**; and the remaining floral characters (except the deeply divided corolla and isomerous stamens), those of *Vaccinium*. The genus *Iaera* was created by H. F. Copeland (in Philipp. Journ. Sci. 47, 82: 1932) for the reception of three species previously referred to *Vaccinium* or *Diplycosia*: *V. lanaëns* Merr. (syn. *V. medinilloides* Elmer), *D. lucida* Merr. (syn. *V. costeroïdes* Merr.), and *V. Loheri* Merr. The type species is *Iaera lanaëns* (Merr.) H. F. Copel. Copeland (l.c. 102) compared the genus with *Costera* and pointed out that the latter is probably the more advanced genus of the two.

The following table may serve to bring out the differences between these three evidently closely related genera. The exceptional characters are italicised.

	COSTERA	IAERA	CYMOTHOË
Petiole-glands	present	present	<i>absent</i>
Leaf-base	rounded	<i>cuneate</i> to rounded	rounded to <i>auriculate</i>
Leaf-apex	rounded to emarginate	<i>acuminate</i> to rounded	rounded to subemarginate
Flower	pentamerous	pentamerous	<i>tetramerous</i>
Calyx-teeth	<i>gland-tipped</i>	no apical gland	no apical gland
Corolla	<i>choripetalous</i> , or almost so	shortly lobed	shortly lobed
Androecium	<i>haplostemonous</i>	diplostemonous	diplostemonous
Anthers	<i>clavate-papillose</i>	minutely papillose	minutely papillose
Ovary	? <i>4-locular</i>	5-locular	4-locular
Seeds	3-4 per loculus	5 per loculus	<i>about 15 per loculus</i>

* The attribution to *Pentapterygium* of a non-articulate pedicel is erroneous.

As pointed out by Copeland (*l.c.* 102), in no other Malayan (or indeed Asiatic) genera of *Vaccinioideae* is the ovary continuous with the pedicel. Viewed, therefore, in the light of the Old World genera only, they occupy a very isolated position in the subfamily. But a glance at some of the *Vaccinioideae* of tropical America brings to light a fairly clear affinity. Several genera of New World *Thibaudieae* exhibit the above type of pedicel (see A. C. Smith in Contrib. U.S. Nat. Herb. **28**, pt. 2 : 1932) ; whilst the genus *Sphyrropermum* (incl. *Sophoclesia*), excluded from *Thibaudieae* by the same author (in Brittonia **1**, 203 : 1933), agrees so closely in most essentials with the three Malayan genera under discussion that little doubt of its affinity with the latter can be entertained. The most important characters in common are the following : epiphytic habit ; palmate leaf-venation ; flowers small, fascicled (peduncle obsolete), 1-2 together, on relatively elongate slender pedicels ; pedicel continuous with ovary ; pentamery or tetramery (sometimes both in *Sphyrropermum*) ; haplostemony or diplostemony (sometimes intermediate stages in *Sphyrropermum*) ; anthers dorsally ecalcarate.

Sphyrropermum differs from the Malayan genera in the following points : filaments longer than anthers ; pericarp thinly papyraceous, smooth, brittle ; seeds elongate-scoberiform ; testa longitudinally striate, not foveolate-reticulate. From this it will be seen that it is almost easier to distinguish the three Malayan genera from each other than from *Sphyrropermum*, at least on technical characters. In general habit the species of the latter genus are much more slender and the leaf-texture much thinner than in the Old World genera. In leaf-shape *Iaera lucida* (Merr.) Copel. is not unlike *Sphyrropermum grandifolium* (Hoer.) A. C. Smith.

The writer is at present unable to agree with A. C. Smith in excluding *Sphyrropermum* from the *Thibaudieae*.* Although its inclusion in this group may render the technical circumscription of the latter more difficult, there are so many points of resemblance between *Sphyrropermum* and the Thibaudiean genera *Themistoclesia* and (especially) *Diogenesia* that to place them in distinct tribes seems to be to obscure an evident affinity.† The species of these three genera are slender or very slender epiphytes, with rather small leaves ; small or very small flowers on slender pedicels which

* Copeland's and A. C. Smith's misgivings about the tenability of the *Vaccinieae* and *Thibaudieae* (as at present defined) as natural groups, are, however, fully shared by the present writer.

† The writer readily admits his comparative ignorance, in detail, of the the main bulk of the American *Thibaudieae* and his great indebtedness to the excellent work of the author mentioned on this complex group : the views here expressed are therefore necessarily only tentative and subject to correction. As H. Sleumer has recently pointed out, the results of Niedenzu's anatomical investigations (Engl. Bot. Jahrb. **11**, 205 seqq., 211-12 : 1890) favour the inclusion of *Diogenesia* (and *Sphyrropermum*) in the *Thibaudieae* : see Notizbl. Bot. Gart. Berl. **12**, 121-3 (1934).

are continuous with the calyx-tube (ovary); anthers dorsally ecalcarate; pericarp rather thin or very thin. In addition it may be pointed out that a parallel to the angled calyx of *Themistoclesia* is found in that of *Sphyrospermum Standleyi* A. C. Smith, and that the elongate filaments of *Sphyrospermum* are paralleled by those of *Agapetes* Ser. *Longifiles* Airy-Shaw (vide K.B. 1935, p. 25). [If, however, as A. C. Smith has suggested (Contrib. U.S. Nat. Herb., l.c. 316), the Asiatic genera referred to this tribe have had an independent origin from those in America, the second point mentioned has less significance.]

At all events, *Costera*, *Iaera* and *Cymothoë* have apparently no near surviving relatives in the Old World. A few characters of apparent analogy may be indicated: free petals in *Costera* and *Vaccinium dialypetalum* J. J. Smith (type of Sect. *Galeopetalum* J. J. Sm.; cf. H. F. Copeland, Philipp. Journ. Sci. l.c. 103); petiolar glands in *Costera*, *Iaera* and *Agapetes* spp.; obsolete peduncles, elongate pedicels and small flowers in all three Malayan genera and in *Agapetes obovata* (Wight) Hook.f. and *A. pilifera* Hook.f. ex C.B. Cl. The solitary-flowered *Vaccinium uniflorum* J. J. Sm. and *V. monanthum* Ridl., known to Copeland (l.c. 83) only from the descriptions, are certainly not related to *Iaera* and its allies, but rather to *Vaccinium lanceolatum* (Bl.) Merr. or to *Rigiolepis*. The Formosan *V. Merrillianum* Hayata (Copeland, l.c.) is closely related to *V. Delavayi* Franch.

The geographical distribution of the genera under discussion does not necessarily militate against the possibility of their close relationship, for parallel instances can be adduced from other Ericaceous genera. For example, the species of *Gaultheria* Series *Dumicolae* Airy-Shaw (Hook. Ic. Pl. 33, t. 3207, p. 2: 1933), including the Sumatran *G. abbreviata* J. J. Sm. and *G. atjehensis* J. J. Sm. are much more closely allied to the West Indian *Brossaea coccinea* L. and its allies (now usually referred to *Gaultheria*) than to any other Asiatic representatives of *Gaultheria*. The remarkable Bornean endemic, *Vaccinium cordifolium* Stapf*, appears to be most closely related to certain South American species, e.g. *V. crenulatum* Dunal. Reference has already been made to the resemblance of the foliage of *Cymothoë* to that of *Macleania amplexicaulis* A. C. Smith, *et aff.*, a feature which strengthens the impression that these Malayan plants belong to an essentially American type not otherwise represented in the Old World. For this reason, and on account of the connection between *Iaera*, etc., and *Sphyrospermum*, and (as it seems to me) between *Sphyrospermum* in its turn and *Themistoclesia*, I refer all these genera provisionally to the *Thibaudieae*.

That these plants represent some of the most advanced (and reduced) types within the alliance is evident from their epiphytic

* "Tentatively assigned" by Copeland (l.c. 104) to the *Neojunghuhnia* group, but I think erroneously.

habit, epedunculate and generally 1-flowered inflorescence, small often tetramerous flowers, occasional complete or partial suppression of one whorl of stamens, and occasional reduction in number of seeds. The occurrence of what must be secondary continuity of pedicel and calyx, and, in *Costera*, of secondary choripetaly, are features of unusual interest. From an evolutionary point of view, all these indications point to relative youth. From the point of view of "age and area," also, the restricted geographical distribution of *Iaera* and its allies would suggest a group of comparatively recent origin. But the total absence from the Malayan region of any "wide" (*sensu* Willis) from which these very local types could have arisen confronts us with an anomalous situation.

Whether the Malayan "Iaeroids" originated in America (more or less contemporaneously with *Sphytospermum*) from a "Thibaudioid" stock and subsequently migrated to Asia, † or whether the presumed "Thibaudioid" progenitors at one time existed in the Malayan region, gave rise to the "Iaeroids" on the spot, and subsequently suffered extinction, is perhaps an insoluble problem, and speculation thereon, though tempting, futile. Their extremely limited distribution suggests that, at the present day, they are not particularly successful members of the general plant-community and indeed, despite considerable specialisation, probably barely holding their own in the struggle for existence.

Some additional facts concerning the genus *Costera* may appropriately find mention here. *C. ovalifolia* occurs on the mainland of Borneo, as is shown by the following specimens in the Kew Herbarium, which agree perfectly with Dr. J. J. Smith's description and plate (Ic. Bogor. *l.c. supra*), except that the leaves are usually definitely emarginate at the apex.

SARAWAK. Without precise locality, Lobb: "Shrub, 6 feet." Garai, 5 miles from Kuching, 21 Apr. 1891, Haviland 817: "Shrub (epiphyte). Flower stalk white."

Both these specimens are in fruit, and on Haviland's there are also a few young flower-buds. From a dissection of one of these, the ovary was apparently 4-locular, as found by Dr. J. J. Smith—a curious condition in an otherwise pentamerous flower. The fruit was too advanced to permit of certainty as to the number of septa. This point requires confirmation from study of better material. The corolla appeared to be completely or almost completely chori-petalous, but its texture in the bud stage was so delicate that, once again, certainty was not possible. I was able, however, to confirm the presence of the curious subclavate papillae on the anthers, described and figured by Dr. Smith. The filaments were almost completely eciliate, as in Smith's fig. 6.

† The terms America and Asia are, of course, here used for the respective land-masses at a time when their configuration or relative position may have been such as to render possible intercommunication between their floras.

Ripe fruit and seeds being hitherto undescribed, a description is supplied herewith (from Lobb's specimen).

Fructus maturus subglobosus, 4 mm. diametro, ut videtur niger, subcarnosus, tandem subexsuccus, pericarpio tenui subcoriaceo. *Semina* in quoque loculo 3-4, pro rata magna, subtrigona, cuneiformia quasi segmenta sphaerae, ventre subrecta, dorso rotundata, 2-2.5 mm. longa, 1-1.25 mm. diametro, pallidiuscule castanea, oculo nudo opaca, testa sub lente pulcherrime reticulato-foveolata, interstitiis vel foveolis valde nitentibus.

KEY TO CYMOTHOË AND ALLIED GENERA OF THIBAUDIEAE.

Corolla 12-16 mm. long ; leaves large, cuneate or attenuate at the base ; stamens isomorphic.....**Thibaudia** § **Agathothibaudia**

Corolla 2-11 mm. long :

Inflorescence racemose or corymbose (peduncle or rhachis evident) ; corolla 6-11 mm. long ; leaves generally caudate-acuminate, very acute, generally rounded at the base :

Calyx-tube 5-angled or narrowly 5-winged ; flowers constantly pentamerous ; stamens generally dimorphic ; filaments usually glabrous, rarely pilose.....**Themistoclesia**

Calyx-tube terete ; flowers pentamerous or tetramerous (stamens sometimes 6) ; stamens isomorphic ; filaments ciliate.....**Diogenesia**

Inflorescence fasciculate (peduncle obsolete) or flowers solitary ; corolla 2-7 mm. long ; stamens isomorphic ; leaves generally rounded at apex, less frequently attenuate :

Filaments longer than anthers ; pericarp very thinly papyraceous, smooth, brittle ; seeds elongate-scoberiform, testa longitudinally striate **Sphyrospermum**

Filaments shorter than anthers ; pericarp firmly crustaceous or subcoriaceous ; seeds subcuneiform, obtusely angled, testa foveolate-reticulate :

Calyx-teeth not gland-tipped ; corolla shortly lobed ; androecium diplostemonous ; anthers minutely papillose :

Petiole without lateral glands ; flowers tetramerous ; seeds about 15 per loculus.....**Cymothoë**

Petiole with two conspicuous lateral hydathode-like glands ; flowers pentamerous ; seed about 5 per loculus.....

Iaera

Calyx-teeth gland-tipped ; flowers pentamerous ; corolla choripetalous ; androecium haplostemonous ; anthers clavate-papillose ; seeds 3-4 per loculus ; petiole with two lateral glands.....**Costera**

XVI—NEW OR LITTLE KNOWN PLANTS FROM SOUTH INDIA : VI *

N.B. Localities in brackets after the name of the species indicate localities noted in the Flora of the Madras Presidency.

Impatiens dendricola C. E. C. Fischer, sp. nov. [Balsaminaceae] ; a *I. laticorne* C. E. C. Fischer foliis tenuioribus longioribus ellipticis basi attenuatis minus hirsutis, alarum lobo inferiore multo longiore recurvato recedit.

A stemless epiphytic herb. *Leaves* pendulous, thinly membranous, elliptic to ovate-lanceolate, obtuse, minutely apiculate ; base rounded or more often attenuate ; 1·8–8·2 cm. long, 1–3·7 cm. wide ; midrib and 4–5 pairs of nerves slender, the latter ascending at a very acute angle ; more or less scattered hairy on the upper face, glabrous below, punctulate ; margins rather distantly crenate, apiculate in the sinuses. *Petioles* slender, terete, 1·5–6·5 cm. long, glabrous. *Scapes* 2–3, semi-pendulous ; peduncles slender, terete, 7–13 cm. long, glabrous. *Racemes* 1·5–4 cm. long, up to 8-flowered ; petioles 1–1·7 cm. long (up to 2 cm. long in fruit) ; bracts at the base broadly ovate, obtuse, 2·5–3·5 mm. long, glabrous. *Flowers* white. *Posterior sepal* oblate, concave, base saccate, 5–5·5 mm. long, 7–7·5 mm. wide, white ; *lateral sepals* falcate-ovate, obtuse, base deeply lobed on the anterior side, 2·5 mm. long, veined. *Wings* white with a tuft of orange hairs a little above the base, 1·6–1·8 cm. long, 3-lobed, the distal lobe straight, strap-shaped, rounded, 8 mm. long, median lobe sub-circular, 6 mm. diam., basal lobe strap-shaped, slightly widened at the apex, strongly recurved, about as long as the distal. *Vexillum* subcircular, obtuse, concave, 6–7 mm. long, produced into a strongly curved, bulbosely clavate spur, 1–1·5 cm. long, white. *Ovary* ellipsoid, 2–2·4 mm. long, glabrous. *Capsule* semi-ellipsoid, one side straight, acute, 8–9 mm. long. *Seeds* sausage-shaped 1·2–1·3 mm. long, dark brown, muriculate, with a dense tuft of crinkled hairs up to 2·5 mm. long at each end.

Coorg, on Thadidiandamolu, 4,000 ft., fls. and frt. Sept., *E. Barnes* 886, 887 (typus in Herb. Kew.) “ On tree trunks in evergreen forest.”

Impatiens Stocksii Hook. f. et T. [Balsaminaceae].
(Bombay Presidency.)

Coorg ; at the foot of Thadiandamolu, fls. white with a yellow tuft at the base of the wings, Sept., *E. Barnes* 888 ; Brahmagiri Hills, Bhagamandala, 3500 ft., *E. Barnes* 889.

Sonerila nemakadensis C. E. C. Fischer, sp. nov. [Melastomaceae] ; *S. grandiflorae* Wall. peraffinis, foliis ovatis basi rotundatis transverse nervatis, calycis viridis lobis latioribus, petalis majoribus rotundatis breviter unguiculatis pallidioribus differt.

* Continued from *K.B.* 1935, 97.

A glabrous *herb* 10–30 cm. high ; stems succulent, once branched. *Leaves* membranous (firmer when growing in the open) ; ovate to ovate-lanceolate, acute, base rounded, 2·5–5·5 cm. long, 1·2–3 cm. wide ; 5-ribbed from the base, the inner lateral pair continued nearly to the apex, connected by faint, obliquely transverse veins ; minutely pustulate on both faces ; margins sharply, evenly, rather deeply serrate. *Petioles* 0·4–3 cm. long, channelled above. *Flowers* rather large for the genus, in terminal umbels or subumbelled short scorpioid 5–7-flowered racemes. *Peduncles* 2–5 cm. long. *Bracts* minute, setaceous. *Pedicels* 4–6 mm. long (up to 10 mm. in fruit). *Calyx* narrowly funnel-shaped or narrowly urceolate, tapering to the pedicel, 7–10 mm. long ; lobes ovate, acute, 2·5–3 mm. long. *Petals* nearly circular, minutely apiculate, shortly clawed, 1·6–2·3 cm. long, pink-purple. *Stamens* 3, yellow ; filaments 5–7 mm. long ; anthers 6–8 mm. long, finely attenuate, curved. *Style* 1–1·2 cm. long, inclined, pink-purple ; stigma capitate, minutely puberulous. *Capsule* turbinate, 6–8 mm. long. *Seeds* oblong or narrowly obovate, 1 mm. long, pale-brown, smooth, apex narrowly appendaged to form sometimes a narrow wing.

Travancore : High Range, Nemaikad Gap, 6500 ft., fls. and frt. Dec., *E. Barnes* 103.

Prof. Barnes reports that the plants growing in exposed situations are smaller and more succulent, often with ovate-lanceolate leaves, those in shady places being more numerous and have more membranous ovate leaves.

This species also closely resembles *S. speciosa* Zenk., *S. elegans* Hook. f. and *S. Bensoni* Hook. f. From the first it differs by the 5-ribbed leaves, the glabrous petioles, pedicels and calyx and narrower calyx-lobes. From the second by the green and glabrous leaves and petioles, the former with rather deeper and not ciliate teeth, glabrous calyx, circular petals and yellow anthers. It is distinguished from *S. Bensoni* by the smaller, purely green leaves and peduncles, the unribbed, glabrous calyx and 3 instead of 6 stamens.

***Sonerila versicolor* W. var. *axillaris* Gamble** [Melastomaceae].

(W. Nilgiris and Wynaad.)

Coorg : Shola at the foot of Thadiandamol, fls. and frt. Sept., *E. Barnes* 883.

***Sonerila Wallichii* Benn.** [Melastomaceae.]

(W. Ghats from the Wynaad to the Anaimalais.)

Coorg : at the foot of Thadiandamol in wet shola forest, fls. and frt. Sept., *E. Barnes* 911 ; Brahmagiri, 3000–4000 ft., *E. Barnes* 913.

***Epithema carnosa* Benth. var. *pusilla* C. B. Clarke** [Gesneraceae].
(Bombay Presidency.)

Coorg : Jersey Falls near Mercara, on wet rocks, fls. Sept., *E. Barnes* 928.

Peristylus brachyphyllus *A. Rich.* [Orchidaceae].

(Bababudan and Nilgiri Hills.)

Coorg ; grassy hills near Mercara, fls. Sept., *E. Barnes* 896.

Peristylus spiralis *A. Rich.* [Orchidaceae].

(Bababudan and Nilgiri Hills.)

Coorg : summit of Brahmagiri, fls. green with yellow lip, Sept., *E. Barnes* 892. "Common on the hills of Coorg ; has an almond smell."

Cryptocoryne consobrina *Schott.* [Araceae].

(W. Ghats.)

Cochin : Karapara River near Kuriarkurti, fls. Dec., *E. Barnes* 959 ; Perambikulam River, *E. Barnes* 962. A little-collected plant of which there is only one rather poor sheet in the flowering stage in the Kew Herbarium, which has only the emergent and not the submerged leaves. Prof. Barnes's specimens show the latter. The submerged leaves are "up to 2 feet long and very narrow with strongly undulate margins, purplish-green, growing in dense tufts in running water. Inflorescence up to 10 in. long, limb 2 in. long, tube 7 in. long and chamber 1 in. long with a somewhat twisted spathe. Margin of the limb thickened, involute and studded with warty processes ; a raised oval palate in the mouth of the limb, palate with many dark-purple blotches, rest of inner surface with purple warty ridges on a light coloured ground ; near the tip the sides unite to form a long twisted tail. Common, growing in cracks of rocks in river beds with some leaves in running water and some in tufts above water." The marginal warts of the spathe and the colouring are not mentioned in published descriptions, nor are they at all clearly visible in the single sheet referred to above.

Amorphophallus sylvaticus *Kunth* [Araceae].

(Circars and Nilgiri-Wynaad.)

Chingleput District ; Tambaram near Vandalur, 200 ft., fls. Aug., *E. Barnes* 880.

In three of the specimens the floral part of the spadix overtops the spathe by $\frac{2}{3}$ –1 in. In other specimens seen by me it is either shorter than or just equalling the spathe.

Eriocaulon Gamblei *C. E. C. Fischer* [Eriocaulaceae].

(Nilgiri Hills.)

Coorg : Brahmagiri, 4,000 ft., fls. Sept., *E. Barnes* 865.

Cyperus Zollingeri *Steud* [Cyperaceae].

(Palni and Travancore Hills.)

Nilgiri Hills, near Naduvattam, fls. Sept., *E. Barnes* 873.

Garnotia courtallensis *Thw.* [Gramineae].

Nilgiri, Palni and Travancore Hills.)

Coorg : Mercara, fls. Sept., *E. Barnes* 860.

Tripogon capillatus *Jaub. et Spach.* [Gramineae].

(Mysore, Wynaad, Cochin.)

Coorg : Mercara, fls. Sept., *E. Barnes* 858, "on tree-trunks and roofs of houses."

Tripogon pauperculus *Stapf* [Gramineae].

(Bababudan, Mysore and Travancore Hills.)

Coorg : Brahmagiri, 4,000 ft., fls. Sept., *E. Barnes* 862.

XV.—MISCELLANEOUS NOTES.

New Andine Malvaceae.—Amongst the interesting plants collected by Miss D. B. Stafford on her recent journey in the Peruvian Andes were some acaulescent *Malvaceae*. One of these proved to be an entirely new species of *Nototriche* and another is considered to be a distinct variety of *Malvastrum Bakerianum* A. W. Hill.

Nototriche armeriifolia *A. W. Hill*, sp. nov., foliis linearibus, vaginis intus dense et longe hirsutis a congeneribus distincta.

Fruticulus depressus, caespitosus, pulvinatus, ad instar *Armeriae vulgaris*; caudex subterraneus, lignosus, firmus, ramosus. *Folia* arcte aggregata, rosulata, linearia, involuta, viridia; petiolus cum vagina 0.8–1 cm. longus; stipulae petiolo adnatae et cum eo quasi vaginam membranaceam formantes, parte libera parva lanceolata acuta circiter 1.5–2 mm. longa uti petiolus facie et marginibus dense hirsuta pilis albidis stellatis 3 mm. longis dense vestita; vagina 3–3.5 mm. lata, dorso glabra; lamina elongata, linearis, 1.5 cm. longa, circiter 1 mm. lata, marginibus incurvis, lobis linearibus brevibus 1 vel 2, rarius 3, circiter 5 mm. infra apicem instructa, lobis circiter 2 mm. longis; lamina supra dense stellato-velutino-hirsuta, subtus glabra. *Flores* petiolo paullo infra medium insidentes. *Calyx* ad medium 5-lobus, 7.5 mm. longus, extra fere glaber, pilis longis sparsis instructus, intus basi nectariis 5 papillosis instructus, lobis triangularibus acutis intus et ad margines pilis longis vestitis. *Corolla* pallide violacea, 1.3–1.4 cm. longa; petala late obovato-cuneata, 4 mm. lata, basi in tubum 4 mm. longum coalita. *Stamina* numerosa, antheris in capitulum globosum dispositis. *Carpella* fere matura 1.75 mm. longa, rostris 0.5–0.75 mm. longis, dorso pilis 3–4 mm. longis vestita.

PERU. Dept. Puno: in a valley running down from the Cunurana range between Santa Rosa de Ayaviri and Sicuani, 1934, *Stafford* 362.

Malvastrum Bakerianum var. **strigosum** *A. W. Hill*, var. nov., a typo foliis omnino dense strigoso-hirsutis, calycibus extra hirsutis, floribus minoribus praecipue differt.

PERU. Dept. Cuzco : high valley, Urcos, 3,600–4,800 m., May 1932, *Stafford S. 32* ; Cuzco, March–April, 1934, *Stafford 325* (type).

One or two of the specimens collected by Miss Stafford under the number 346 have the outer side of the calyces covered with strigose hairs and the pedicels are also furnished with similar hairs, otherwise they agree fairly closely with typical *M. Bakerianum*.

The following additional localities for *M. Bakerianum* may be recorded : Sicuani Distr., *Stafford 326*. Dept. Puno, grassy meadows and slopes on puna, 3,850–3,900 m., *F. W. Pennell 13417*. Sta. Rosa, 3660–4870 m, *Stafford S. 30*, *S. 31*, *S. 31A*, *S. 31B*.

Pennell's specimen is the only one of these collections which bears mature fruits and as they were not seen when the description was drawn up details are now added :—

Carpella reniformia, 4.5 mm. longa, rostrata, rostris 1 mm. longis, dorso pilis stellatis vestita. *Semina* reniformia 1.5 mm. longa et lata.

The flower colour in *M. Bakerianum* varies from white to lavender and mauve, but in the variety *strigosum* they are tinged with a rosy-red on the outside towards the apex of the petals.

A. W. HILL.

The Britton Herbarium.—We learn, from the “ Journal of the New York Botanical Garden,” that “ in commemoration of the late Dr. N. L. Britton, Director of the New York Botanical Garden from its incipient stages in the last decade of the preceding century until his retirement in June, 1929, at the age of seventy years, the Board of Managers of the Garden, at its annual meeting, held January 14, on motion of Dr. E. D. Merrill, Director, voted that the general herbarium (Phanerogams) of the New York Botanical Garden be henceforth designated as **The Britton Herbarium**, New York Botanical Garden.”

The Diseases and Curing of Cacao.*—This book has been written as the outcome of a discussion at the Imperial Mycological Conference in 1929, when the need was stressed for a series of handbooks dealing with the diseases of the major tropical crops. The diseases included are those caused by plant parasites, chiefly fungi.

Chapters 1, 2 and 3 deal with root diseases, stem diseases and pod diseases respectively, while chapter 4 is devoted to the witches' broom disease (caused by *Marasmius perniciosus* Stahel) which is of great importance in South America and Trinidad. In chapter 5 the author has usefully brought together a great deal of scattered literature dealing with the preparation of “ curing ” of cacao, and has appended references to the papers and books consulted. At

* The diseases and Curing of Cacao. By H. R. Britton-Jones. (Macmillan & Co., Ltd. 1934, pp.x and 161, 37 figs. uncol., price 10/-).

the end of the book is a bibliography of 192 titles of papers and books concerned with the diseases of cacao and their control.

As the work is intended primarily for the use of agricultural officers and planters, detailed technical descriptions of the parasites have in general been omitted. The descriptions of the macroscopic features and the disease symptoms caused, together with good illustrations, should enable those interested to recognise the more important and conspicuous diseases with which they have to deal.

Throughout the work the author has emphasised the influence of agricultural practices and of external conditions in general in relation to the incidence of disease. In speaking of root-diseases, for instance, he stresses the importance of soil conditions and points out that the beneficial effects obtained by trenching may often be due as much to aeration and drainage as to restriction of the parasite. The book is thoroughly practical and admirably suited to the requirements of those for whom it is intended.

Its value is not seriously affected by some confusion evident in chapter I as to the identity of the parasite causing one of the most common root-diseases of Hevea and Cacao in the Old World. Following van Overeem, the fungus is called *Rigidoporus microporus* (Sw.) van Overeem. This is unfortunate for two reasons, firstly because systematic mycologists in general have not accepted the numerous new genera proposed by Murrill in his work on *Polyporaceae*, and secondly because, as Professor Britton-Jones himself mentions, there is some doubt as to whether the West Indian fungus, originally described as *Polyporus microporus* Swartz, is the same species as *Polyporus lignosus* Kl. (= *Fomes lignosus* (Kl.) Bres.) of the Eastern Hemisphere. The discussion on pages 1 and 2 as to the name of this fungus indicates a lack of appreciation by the author that the name *Rigidoporus microporus* (Sw.) van Overeem denotes the same fungus as *Polyporus microporus* Swartz. If *Polyporus microporus* Swartz is not the same species as *P. lignosus* Kl., and the West Indian fungus is definitely less strongly parasitic than *P. lignosus*, then the specific epithet *microporus* of Swartz cannot be used for the cause of the disease under discussion, which according to the author is not known in the Western tropics.

E. M. WAKEFIELD.

Medicinal Plants.*—This volume deals primarily with the early history and uses of medicinal plants. Attention is directed chiefly to plants that occur in this country and Europe but some of the better known medicinal plants of other countries are also discussed. These appear under chapters entitled "Medicinal Plants of India, China and Chaldea," "Egypt and Greece," and "Rome and the Early Christian Era." It is hardly feasible to

* "The Physic Garden, Medicinal Plants and their History," by Edith Grey Wheelwright. Jonathan Cape, London, 1934. Pp. x+228, 18 illustrations. Price 10s. 6d. net.

separate a study of the medicinal plants of early races from a study of their medicine and the author has acted wisely in not attempting this. The discussions relating to early medicine and the strange practices then in vogue undoubtedly add interest to the book and should appeal more especially to the general reader.

With regard to medicinal plants in Britain, their uses are discussed from "the Anglo-Saxon period to the British Pharmacopoeia" and a separate chapter contains notes on all the more important species that are regarded as of value in medicine or to the herbalist at the present time. These are arranged according to families. Many facts of special interest are included in the discussion of the drug trade and the cultivation of drug plants in this country and on the Continent. The account given of the changes that took place in drug plant production during the Great War and cessation of supplies from Germany forms an interesting record.

The inclusion of jaborandi (*Pilocarpus microphyllus*) among Chinese medicinal plants is an unfortunate error. It is also to be regretted that the use of authorities with specific names is inconsistent and that a comma is used after the latter. The number of misprints is rather large and there are several erroneous statements. For example, *Pulicaria dysenterica* is stated (p. 177) to be uncommon, *Erythraea Centaurium* (an annual) is said (p. 179) to "branch out into shrubby plants", and it is stated (p. 165) that *Cochlearia officinalis* is "not considered indigenous."

In compiling the volume the author has undoubtedly made an extensive study of the wide range of literature that exists on this subject and has not failed to realise its magnitude when, in her introductory remarks, she makes the modest claim that "it is no more than a student's excursion into certain aspects of the subject."

F. N. HOWES.

Plant Hunting in Alaska.*—The manifold delights of this narrative of Miss Hutchison's recent journey in Alaska will immediately strike every reader; in a scientific periodical these can merely be recorded, together with a strong recommendation to all lovers of travel and adventure to read this charming volume, illustrated by photographs and by reproductions of watercolours by the author.

There are two appendices, one giving a descriptive list of the native curios presented to the Cambridge University Museum of Ethnology, the other comprising an enumeration of the plants collected for the Kew Herbarium. The latter gives particulars of locality and habitat, and in some cases the local names and uses of the plants. Two hundred and twenty-eight species are listed. An account of the

* "North to the Rime-Ringed Sun," by Isobel W. Hutchison. Blackie and Son, Ltd., 1934. Pp. ix+262, 20 plates. Price 12s. 6d.

botanical aspect of Miss Hutchison's journey has already appeared in this journal (K.B. 1934, 345).

Miss Hutchison's book forms a striking record of personal courage and endurance and is a great tribute to the fine character of the men who helped her on her way. It is gratifying to know that the rigours and perils so graphically described have resulted in such a comprehensive and useful collection from a botanically little-explored part of the world.

The Genus *Hemerocallis*.*—Dr. Stout states in the preface that he has based this work largely upon a personal study of the extensive living collection of the genus in the New York Botanical Garden. In chapter 5 we read "For several of the species, all the plants studied at the time of naming were of a single clone which may not be typical or even very representative of the wild members of the species. An extensive critical study has not been made of the Daylilies of the orient. No doubt various valid species remain to be discovered and named." It is therefore to the horticulturist, rather than the botanist, that the book will be of most use. There is a concise key to the thirteen species recognised by the author and a large number of clonal varieties are enumerated in an alphabetical list occupying no less than 40 pages in chapter 6, but the absence of a key to these clones will be regretted by the systematist. The uses of daylilies are dealt with in detail. The great importance of members of this genus as herbaceous perennials will be known to all gardeners but fewer people are acquainted with the employment of the flowers as an article of food. For this purpose *Hemerocallis fulva* and other species have long been cultivated on an extensive scale in China and the dried flowers sold under the name "gum-jum." The culture and care of the plants is dealt with fully by the author and there is much valuable information on the methods of propagation. The statement is made that "few Daylilies reproduce true to type by seed." The value of the book is much enhanced by thirty-six plates of excellent illustrations, a bibliography as an appendix, and a very full index.

C. V. B. MARQUAND.

* Daylilies ; the Wild Species and Garden Clones, both Old and New, of the Genus *Hemerocallis*, by A. B. Stout, Ph.D. The Macmillan Co., New York, 1934. Pp. 119. Price 12s. 6d. net.